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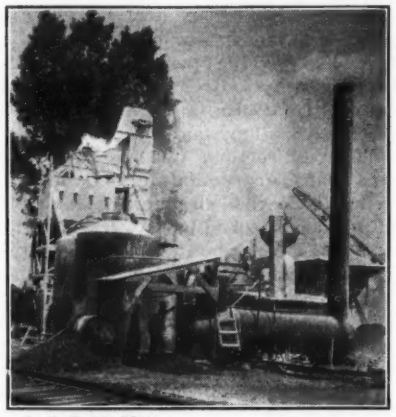
Contractors and Engineers Monthly

Vol. 43, No. 4 APRIL, 1946 $3 a Year, 25 Cents a Copy

Covering the Field

- **Bridge Work**
  A swamp and river in the south are now crossed by new modern concrete trestles and a steel bridge, totaling a mile in length, built by four contractors. See page 1. The life of an old steel bridge has been prolonged by extensive improvements in the mid-west. The work is described on page 25.
- **Bituminous Paving**
  Two bituminous roads in different parts of the country called for varied treatment. Asphalt plant-mix was laid on one large contract described on page 1. Shovel-mixed tar and gravel was laid as resurfacing on an 8.4-mile project. See page 81.
- **Canal Banks Stabilized**
  The steep troublesome banks on the old C. & D. Canal were brought under control in a recent grading, drainage, and revetment contract, followed by grass seeding, described on page 1.
- **Grouted-Rock Levees**
  Building 10 miles of levees and groins for flood control was the joint work of three contractors. Rock was taken from a new quarry for a blanket cover, which was then filled with grout. Full details are given on page 2.
- **Airport Construction**
  Flexible-type runway paving on a stone base completed the work on a Maryland airport built by three contractors; the grading and drainage are also described. See page 6.
- **Highway Widening**
  Well chosen equipment speeded the widening of an Indiana highway with side trenches dug at a mile-a-day rate despite the labor shortage. The concrete was also poured in fast time, nearly half a mile in 10 hours (page 7).
- **County Road Work**
  Maintaining 500 miles of rural county roads on an annual budget of only $25,000 is a serious problem but is helped by the construction of such economical low-level culverts as those described on page 11.
- **Road Maintenance**
  Using existing stone in surface-treating a traffic-bound road kept costs low in the secondary-road improvement described on page 37.
- **Dredging**
  Enlarging an industrial canal in the Gulf region was done by the veteran dredge San Diego, described on page 39. To obtain gravel for dam and canal work, a contractor built and operated his own dredge. See page 65.
- **Grading**
  Building an access road on 7 and 8-per cent grades to a hill-site airport required heavy cuts and fills. This grading was handled by shovels and tractor-scraper units moving downhill with their loads. See page 44.

(You will find "In This Issue" on page 4)



C. & E. M. Photo
Hot-mix for 36 miles of resurfacing in Kentucky was prepared in a Hetherington & Berner 50-ton-an-hour plant.

Plant-Mix Paving 36 Miles of Road

Four Different Highways Included in One Contract; Asphalt Plant Set Up in Location Central to Job

✦ WITHIN three months last summer nearly 36 miles of highway in central Kentucky were given a surface of asphaltic concrete with material supplied from an asphalt plant set up by the contractor in such a location that the hauling distance from plant to road site was kept to a minimum. Four different roads, with sections going through two towns, were included in the contract for mixing and laying a single course of black-top surface nearly 1 inch thick which was awarded by the Kentucky Department of Highways to the Carey Construction Co. of Lexington, Ky., at a cost of $143,763.50, the low bid for the project.

(Continued on page 31)

Trestles and Bridge Span Swamp and River

By WILLIAM H. QUIRK,
Editor

Four Contractors Share Construction of Concrete Piers for Plate-Girder Bridge, Trestles, Fills

✦ FOUR contractors are constructing new approach fills and concrete approach trestles, together with concrete piers, to carry a 570-foot continuous-deck plate-girder bridge across the main channel of the Great Pee Dee River on U. S. 76 in the northeastern part of South Carolina. Separating Florence County on the west from Marion County on the east, the Great Pee Dee River at this point flows nearly due south on its way to the Atlantic Ocean. The new structure will replace a narrow bridge made up of two 180-foot trusses built by the two abutting counties twenty years ago. Wooden approach trestles to this old span cross the swamp bordering the river on each side at an elevation only 2 feet above the swamp. The new fills will be 22 feet above swamp level.

The new construction, 8 miles east of Florence, is nearly 2 miles upstream from the old bridge, and about 1,000 feet south of the main-line crossing of the Atlantic Coast Line Railroad. This new location consists of 3 miles of approach fills and 1 mile of bridges, including concrete trestles and steel-girder spans. The distance between the county seats of Florence and Marion will be shortened by eliminating the old winding section of U. S. 76 through the swamp, over which traffic has been carried as usual during the building of the new river crossing.

Main Bridge

Work on the project began in February, 1945, when the State Highway Department awarded a contract for the construction of six piers, four in the river and one in the bank on each side, to Joseph W. Barnwell of Columbia, S. C., and D. M. Rickenbaker of Union, S. C., who also have the contract for laying the reinforced-concrete deck on the steel span. A concrete trestle will connect to this main span at the west end, while the fill on the east bank will come right up to the main bridge.

The 570-foot length of this 30-degree-skew bridge is made up of two 105-foot spans, from the pier on the bank to the pier in the river on each side, and three 120-foot spans between the four piers in the river. At this point the river is about 300 feet wide with an average depth of 12 feet.

The contractor started work by driving steel sheet piling for the twin footings to support the pier on the east bank of the river. A Northwest No. 15 crane with a 40-foot boom from which hung 20-foot swinging leads drove Bethlehem M-116 sections 16 inches wide and ½ inch thick x 40 feet long, using a McKiernan-Terry No. 7 hammer powered by steam from two coal-burning 30-hp boilers, one vertical and one horizontal. When the driving was completed, a ⅜-yard clamshell bucket was attached to the boom of the crane, and the footings, each of which measures 13 x 16 feet with 10 feet of earth between them, were excavated to grade.

Double Footings

In each of the double footings twenty-four untreated wooden foundation piles were driven, measuring 50 feet long with an 11-inch diameter at a point 25 feet from the tip, and an 8-inch tip. All these foundation piles were obtained in the woods within 2 miles of the bridge site. The piles were driven with the previously mentioned rig equipped with a 2,000-pound drop hammer to a 15-foot penetration into the hard stiff clay

(Continued on page 60)

C. & E. M. Photo
A Jaeger truck-mixer takes on a load at the batching plant for a pier pour on the Great Pee Dee River bridge.

Canal-Bank Slopes Stabilized, Seeded

Grading, Drainage, and Revetment by Contract; Slopes Seeded as U. S. E. D. Maintenance Project

✦ FROM the time of its construction over 100 years ago, the deep cut at the summit divide of the Chesapeake & Delaware Canal has posed a problem as to the best method of stabilizing the steep banks along the sides of this deep excavation. Recently Hendrickson Brothers, contractor from Valley Stream, L. I., N. Y., successfully stabilized a 2,000-foot stretch of canal bank for the U. S. Engineers with a three-point program of terrace excavation, installation of adequate drainage, and construction of a revetment of stone riprap along the lower face of the slope bordering on the water. When this contract was completed, the banks were then covered with topsoil, fertilized, seeded, and mulched in a separate maintenance operation of the U. S. Engineers. Because of the man-power shortage, German prisoners of war from Fort DuPont, Del., were used on both phases of the work.

The Chesapeake & Delaware Canal, important inland waterway connecting the Delaware River and Chesapeake Bay, was dug between 1824 and 1829 with its eastern entrance at Delaware City, Del., and its western terminus at Chesapeake City, Md. The original construction presented a difficult engineering problem, with the excavation

(Continued on page 17)

New Grouted-Rock Levees Tame Mountain Streams

Three Contractors Join Forces to Build 10 Miles Of Levees and Groins for Flood Control in Calif.

New Quarry, 8 Miles From Project, Provided Rock; Drill, Blast, and Screen 550,000 Tons of Granite

By RAYMOND P. DAY,
Western Field Editor

(*Photos on pages 42 and 43*)

✦ FLOWING at a speed of 25 miles an hour down the sharp grade of the Santa Ana Valley floor, flood waters from the lofty San Gabriel and San Bernardino mountain ranges in California have inundated the upper reaches of this rich and well populated valley five times in the past thirty years. People and livestock have drowned; millions of dollars of property damage have been wrought. The disastrous flood of January, 1943, was the worst overflow in all the history of Lytle and Cajon Creeks. Railroad bridges were washed away and vital war traffic was backed up in rail-yards as far east as Chicago. So it became imperative that a program of flood-control construction be undertaken immediately on these two normally dry and innocent-appearing streams before the beginning of the 1945-46 flood season.

The resulting program of construction was based on studies and surveys made by the Los Angeles District Office of the U. S. Army Engineers at the urgent request of the San Bernardino County Flood Control District. On the basis of the Army Engineer survey report, authorization for a Lytle Creek flood-control program was granted by Congress in the Flood Control Act approved on December 22, 1944. Not without its attendant problems and difficulties, the job has now progressed to the near-completion stage.

The Lytle Creek flood-protection program provides, at this time, for a reinforced-concrete rectangular channel extending northerly from Warm Creek, through Colton, a distance of approximately 3 miles to the upstream side of Foothill Boulevard, together with a reinforced-concrete by-pass structure at Foothill Boulevard, and approximately 57,000 linear feet of compacted earth-fill levees and groins located upstream from the boulevard.

This work was divided into two contracts for construction. The lower contract included the concrete rectangular channel extending downstream from Foothill Boulevard, and the upper contract included the by-pass and levees located upstream.

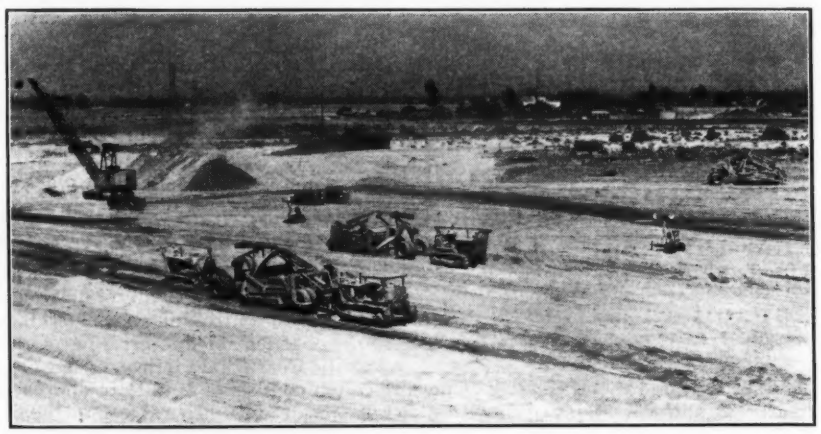
The latter was awarded to Winston Brothers Co. of Minneapolis, Utah Construction Co. of San Francisco, and the A. S. Vinnell Co. of Alhambra, Calif., operating jointly. The job bid price was $2,768,432. The principal features of this contract were a reinforced-concrete by-pass structure and some 57,000 linear feet of compacted earth-fill leeves and groins, faced with from 18 to 24 inches of grouted quarry-run rock, and derrick-stone toe protection on the stream side. Construction of the grouted stone facing involved some of the first large-scale mechanical handling of quarry-run rock in this area. The rock ranged from 10 to 500 pounds in weight, and posed perhaps the most acute problem of the entire project: that of securing a uniform but relatively thin layer of stone without resorting to expensive hand placing.

The 10 miles of levee construction was spread out over thirteen structures. On the left bank just above the intake structure is Muscoy Levee, 13,165 feet long and from 20 to 25 feet high, measured from toe to crown. It trains the water towards the concrete apron in the intake structure. On the left bank of the stream below the base of the San Bernardino Mountains are four Muscoy groins and the Upper and Lower Devore Levees. Cajon Creek flows through a canyon beyond this point and no extensive damage is possible there.

On the right bank of the stream directly across from Muscoy Levee is the Island Levee. Five groins located along Riverside Avenue on the right bank below the San Gabriel Mountains will train water away from that street and steer it towards the lower levees.

Excavation and Fill

Levee design provided a crown width of 18 feet. The structures vary from 10 to 20 feet high, with a channel side slope of 2.25 to 1. The rock blanket is 18 inches thick at the top, increasing to 24 inches at the bottom of the slope. Grouted blanket construction was carried down to the bottom of the toe trench approximately 10 feet below streambed elevation. In order to prevent scour along this toe, the design called for stone up to 3 tons in weight to be placed in the toe trench after grouting was finished and the voids filled with streambed sand.



Earth for the levees in the San Bernardino flood-control project was placed by a fleet of dirt-moving scrapers towed by Caterpillar D8 tractors.

Because much more fill was required than could be secured from necessary excavation, borrow areas were designated, for the contractor's use. Tractor-drawn equipment was used for the construction of all levees and groins, except for the toe section which was dug by draglines. A fleet of twenty Caterpillar D8 tractors, towing LeTourneau and Wooldridge 12 to 20-yard scrapers, was used on an average haul of 1,000 feet. The 2.25 to 1 levee slopes were shaped by cable-operated bulldozer blades which graded downhill and back-bladed uphill on the same pass. Excess earth then remaining at the bottom of the slope was removed by dragline when the toe trench was dug. While the height of levees and groins varied somewhat to suit local flood conditions, about 20 feet of fill was generally placed.

Contract specifications for fill were not excessively rigid, and the contractor was permitted to place levee earthwork in layers from 12 to 15 inches deep before compaction. Reasonably uniform density was secured by the passage of tractors, scrapers, water tank trucks, and a motor grader.

In the case of the by-pass, by-pass levees, intake levees, and a portion of the Muscoy structure adjacent to the stream intake, better density was specified. Here the depth of earth layers was limited to 12 inches. Enough water was added to the soil to produce the best degree of compaction under the weight of earth-moving equipment.

(*Continued on page 28*)

✦ QUARRYING 550,000 tons of blanket and apron rock for the protection of levees and groins in the San Bernardino, Calif., flood-control project described in the companion article on this page involved the opening of a new rock quarry in Lytle Creek Canyon, and the problem of controlling high water while rock excavation was in progress.

The contractors, Winston Bros. Co., the Utah Construction Co., and the A. S. Vinnell Co., had originally planned to dig a deposit of alluvial wash material in Lytle Creek about 8 miles above the center of their levee job, to pass this material through a grizzly to screen out objectionable fines under 6 inches in size, and use the grizzly-retained rock on the levee protection blanket. Col. Rufus W. Putnam, C. E., District Engineer of the Los Angeles District at that time, objected to the use of such rock unless it was cracked in half so as to provide at least one flat surface. Besides this obstacle to its use, explorations and studies showed that far too much waste material was hidden underneath the top rocks for the operation to be economical, so the contractors were forced to open a quarry near the site of their original scheme. It was located in Lytle Creek Canyon in San Bernardino County, about 8 miles from the job and 9 miles due north from the center of the city of Rialto, Calif.

The rock here is largely blue and brown granite, weighing from 175 to 180 pounds per cubic foot, with a hardness factor of 5. Considerable iron ore and other minerals are also present. The owner of mining rights near the lower quarry had sunk a shaft and done considerable prospecting for molybdenum, a rare metallic element of the chromium group. Sheer walls rise 1,000 feet above the canyon floor on a slope of approximately 1½ to 1, with knobs of solid rock protruding from the mountainsides. Two of these knobs were selected for quarry sites. They seemed hard and sound, with a minimum of stripping necessary.

Coyote Drift Operations

Coyote drift holes 5 feet high x 3 feet wide were started horizontally from canyon-floor elevation under a subcontract. Four partners, O. D. Williams, Ted Deal, Ralph Ogleby, and Stover Smith, subcontracted the driving of coyote tunnels from the prime contractor at a price bid of $10 per linear foot. The price provided only for the excavation of the tunnel, and shoring if necessary. Loading and shooting were done by the Winston Bros. quarry men.

The subcontracting partners used two Ingersoll-Rand JB-5 tripod-mounted Jackhamers, with a maximum of 6-foot steel, and Timken detachable bits, for the rock drilling. Nine holes were drilled equidistant in the face, determined by the driller's good eye, and were extended in the rock 4 feet. Twelve inches of drilling in this rock dulled the very best oil-quenched bits, and after they were resharpened three times they had to be discarded. Loss of gage was also very pronounced in the granite.

Holes were loaded with 8 sticks of Giant 40 per cent gelatin dynamite, and set off by electric blasting caps and an Atlas hand blasting machine. In order to get the center of the course out first, each shot was pulled with as many as seven 1-second delays. The center of a tunnel shot was always broken first, and when the subsequent shots went off they broke away the remainder of the rock to neat lines and pushed it towards the loosened center.

Two little push carts were made up of 14-gage sheet steel, and mounted on two old conveyor-belt idlers. Each box measured 34 inches x 17 inches x 18 inches deep, and could be pushed out of the tunnel, fully loaded, by one man. After the shots were pulled, broken rock was shoveled into this hand cart by one of the two drillers. The other man trundled the cart away and dumped it off the end of a dump pile outside the coyote hole.

Coyote holes were extended about 55 feet horizontally, and two 60-foot wings were then blasted out at right angles. The tunnels were constructed on approximately 250-foot centers, but in any case a good outcrop of solid granite was selected and the hole was centered in the outcrop.

Pockets of Atlas Flo-Dyn No. 4 powder were then placed in the lateral tunnel, at intervals of 5 feet, and backfilled with clay and other topsoil nearby. Powder was used at the explosive ratio of ½ pound per ton. No powder was placed in the 55-foot straight-in tunnel; this was backfilled with clay and earth. A total of 560 cases of powder accounted for 40,000 tons of stone. The charge was exploded with Primacord detonating fuse.

In connection with loading and shooting, Winston Bros. employed a Savoy powderman-driller who has been accumulating experience under his hard hat for about 25 years. He answers to the name of "Jo-Jo" Mardes. Joe has a theory about Primacord fuse which has turned out, for the past six or seven years, to be good blasting insurance to whoever signed Jo-Jo's check on Saturday night. Instead of using a No. 6 electric blasting cap to knock Primacord off, Jo-Jo uses a stick of 60 per cent dynamite. If he shoots more than three holes, he likes to use a stick at each end.

He explains it this way: he has seen an electric blasting cap burn off about 12 inches of the end of the detonating fuse without detonating any charge. He has seen one hole explode, and rock loosened and knocked around in the others, breaking the fuse and messing things up generally. These failures were doubtless due to faulty field practice and are not a reflection on the detonating fuse, but resultant messes were always costly to re-load or clean up. For the cheap cost of one or two sticks of dynamite, Jo-Jo simply does not feel that he can afford to have any misfires. And he never has.

Coyote drifts worked successfully on this job because the granite is seamed and broken by seismic action. Shots exposed a face which averaged 125 feet high and reached a maximum of 230 feet in height, standing on a slope of ¼ to 1. This method of shooting was con-

(*Continued on page 71*)

Ready for Maine's Post-war Tourists

This newly completed Texaco Asphaltic Concrete pavement, laid on a 4-street intersection in Bangor, Me., has been constructed over worn concrete.

The first post-war summer soon will be with us. When it arrives, thousands of motorists will head for Maine, whose lakes and woods provide one of America's favorite vacation lands.

Maine's streets and roads, necessarily neglected during the war, are now being prepared for anticipated heavy traffic. The city of Bangor, for example, was faced by the problem of what to do about the worn, uneven concrete pavement on the busy intersection of Broad, Main, Hammond and Central Streets. A new plant-mixed Texaco Asphalt surface has been constructed on top of the old pavement, providing an ideal solution from the standpoint of both economy and serviceability. Crushed gravel was selected for aggregate, while 85-100 penetration Texaco Asphalt was employed as binder.

Texaco Asphaltic products have enjoyed the confidence of America's road builders for 40 years. Strategically located Texaco refineries make these products readily available everywhere east of the Rockies. Remember, too, that Texaco Engineers, who are Asphalt specialists, are always at your service.

TEXACO REG. T. M.

THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd St., New York City (17)

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Cross Currents in Construction

As an aftermath of war and of great concern to everyone is the breakdown of that cooperative spirit which prevailed throughout the country during those four years of strife. Most apparent in the lack of cooperation are the current management-labor disputes, but the construction industry, while not necessarily crippled by strikes, still contains forces whose objectives would seem to be pulling at cross purposes with each other to the detriment of the common good. And the common good in this industry, almost everyone would agree, is the construction of badly needed private and public works such as roads, bridges, dams, levees, irrigation projects, etc., so that their facilities would quickly be available for use and at a price which is within reason.

Many of the contractors who will do this work are in something of a quandary. With them the war period has been either a feast or a famine. Some have been enriched by war contracts, but the majority have had to tighten their belts during this lean period of construction. Now when they are called upon to submit bids, they are uncertain about the future. Will labor costs continue to rise? Is new equipment available at prices they can afford? Can they pledge long-term commitments in a contract without incorporating some hedge against the growing inflationary spiral?

The equipment distributor and materials men are plagued in turn by a demand for their goods which they may be unable to supply, or for which they have to charge much more than contractors have been accustomed to pay. Their operating costs have risen, but price controls limit what they can charge for their wares. They feel that price-ceiling limitations, or the manufacturers themselves perhaps, are contributing to their economic woes.

OPA ceilings are also a bugaboo to manufacturers who would like to see them abolished. They feel that unfettered competition will serve to keep prices down, but admit that equipment costs are bound to be higher than in the pre-war years, when the effects of the long depression were still influencing prices right up through 1941. Their costs too, particularly labor, are high, with no prospects of their being lowered.

In the middle of these groups are the Federal, state, or local government units, or the private concern which is trying to get some project constructed, naturally at the lowest possible cost. In the case of public works, the taxpayers who foot the bills are concerned about the rising cost of such construction, and their representatives, the engineers, must see that unreasonable prices are not charged. But this group too has been upset by the trend of the times. In state highway departments, for example, engineering staffs are shorthanded from the exodus of personnel to private industry where the remuneration is greater. It is generally recognized that higher salaries must be paid to retain first-class engineers in these departments.

Government agencies are well aware that public improvements cannot be indefinitely postponed but must go on, and that they must pay more for them. But they also want to keep these costs within bounds. With this in mind, one mid-western state is breaking down large highway contracts into different items, and awarding the work to several contractors. In this way a contractor can be induced to use present-day prices as a basis for his bidding, and can omit contingencies which he might be constrained to insert should he accept a single large contract needing a year to complete.

One western state is trying to push its grading projects which, being done mainly with machinery, are not too subject to fluctuations in cost. Other jobs such as paving, where the amount of skilled hand labor is considerable, are being delayed, since contractors are wary of committing themselves to a long period of time on such work.

To unite these seemingly opposed economic interests in the construction industry is no simple task. The removal of the victory incentive which held these interests together, superficially at least, during the war years has been the signal for each faction to try to improve or consolidate its economic status. Not until all concerned realize that the post-war era still demands some amount of personal sacrifice at the expense of monetary gain will the construction industry profit as a whole. The time for sincere cooperation is not behind us.

Keep your eye on the ball!

Howard V. Pehrson, who has joined the C&EMonthly staff as Field Editor in the central and southern states.

Another Field Editor Added to C&EM Staff

CONTRACTORS AND ENGINEERS MONTHLY is pleased to announce the addition to its staff of Howard V. Pehrson as Field Editor to cover sixteen states comprising the central and southern territory east of the Mississippi. Recently discharged from the Army after three years with the Air Force, Mr. Pehrson brings to CONTRACTORS AND ENGINEERS MONTHLY a wealth of experience in construction and engineering writing, having served for seven years as Field Editor for the *Improvement Bulletin*. His articles on a wide variety of construction have also appeared in other regional and in national publications.

One of the first three correspondents accredited by the War Department to cover the construction of the Alaska Highway, Mr. Pehrson not only wrote a series of articles on this project but has also given illustrated lectures on this work before a number of engineering groups. He attended the University of Minnesota, and holds membership in the Engineers Club of Minneapolis, the Minnesota Association of Professional Engineers, and the Northwestern Good Roads Association. Mr. Pehrson will make his headquarters at Minneapolis, Minn., but will spend most of his time in the field visiting construction projects and state and county highway department work.

Coverage of the West is handled for CONTRACTORS AND ENGINEERS MONTHLY by Field Editor Raymond P. Day from California, with William H. Quirk, Editor, operating out of New York and covering states along the northeastern seaboard. With three Editors in the field, C&EMONTHLY is prepared to continue, with thorough and intensive field work during the coming busy construction season, its policy of presenting practical articles obtained on the job for the helpful guidance of its readers.

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C&E Executive Dies

Herbert K. Saxe, 77, Treasurer of the Buttenheim-Dix Publishing Corp., publisher of this magazine, died March 12, at Binghamton, N. Y. He had been ill three months.

Mr. Saxe joined *The American City* as its Treasurer in 1912. When CONTRACTORS AND ENGINEERS MONTHLY was founded in 1920, he assumed like duties. In earlier days, Mr. Saxe had been associated with the McGraw Publishing Co. and the firm of Estey & Saxe. A resident of Madison, N. J., he was famed as the champion commuter on the Delaware, Lackawanna & Western Railroad.

Urge Anti-Diversion

Meeting recently in Boston, the members of the Massachusetts Highway Users Conference urged passage of legislation banning diversion of highway revenues to non-highway purposes. Representatives of the Grange, the American Automobile Association, the New England Council, and other groups are united in the effort. During the past 13 years $109,000,000 of the state's revenue for highways has been diverted, one speaker revealed.

Fight Our No. 1 Enemy

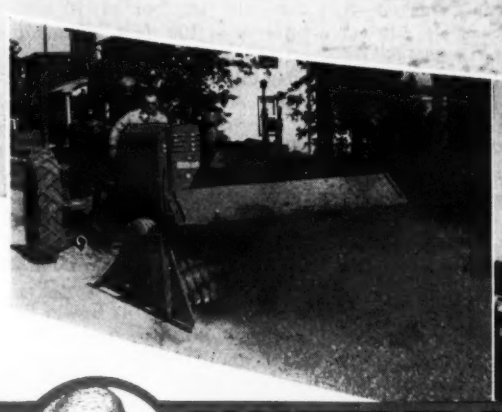
One of eight persons around you—or possibly you, yourself—is fated to die of cancer. Such is the toll this horrible disease exacts . . . three die from it every 10 minutes.

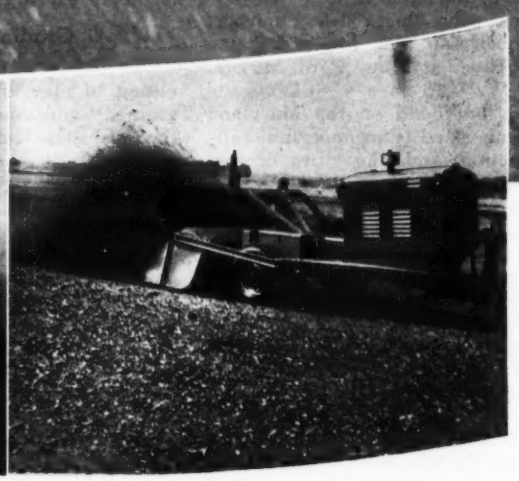
Though a personal threat to each one of us, cancer has one vital fact about it: we *can* do something about it. By detecting it in time and treating it effectively, as many as 50 per cent of the cases can be cured.

April has been named Cancer Control Month by the President. The American Cancer Society is seeking $12,000,000 to fight this disease on all fronts: by education, increased treatment, and intensive research. Cancer plays no favorites. Give to the Cancer Fund . . . it fights for you!

THE SEAMAN IS THE BEST TOWEL

TO DRY WET AGGREGATE





PIONEERED BY SEAMAN

Use the SEAMAN MIXER for Soil Pulverization

★

In-Place Mixing for All Soil Stabilization Processes and in Bituminous Construction

★

Soil Pulverization to Achieve Greater Density in Earth Dams, Fills and Levees

★

Seed Bed Preparation for Seeding Park Lawns, Roadsides and in Landscape Operations

WHEN sudden rain causes an excess of moisture in aggregate, long and costly drying procedures together with expensive removal and replacement of the material, are eliminated with the SEAMAN MIXER. In fact, many contractors have reported that just in the use of the SEAMAN as a dehydrater alone, — its investment has been amply repaid, — to say nothing of its day-by-day economy in road mixing operations. Operating on the wet aggregate (hood open, of course) the material is thrown high in the air. Mechanical dissipation of moisture due to high velocity is a factor in the consequent dehydration, but the action of air and sun is of even greater consequence.

The same principle applies in the use of the SEAMAN MIXER to remove excess water or solvents from asphalt emulsions on cutback jobs, — thus speeding the set. Finishing and rolling operations can be handled much sooner, — a factor of economy in total production made possible only to a SEAMAN owner.

C-118

The **SEAMAN MIXER**

SEAMAN MOTORS

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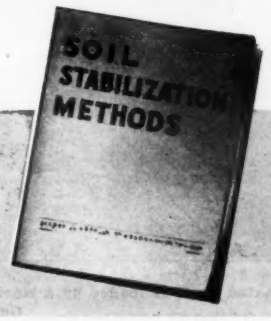


Heavy Grading, Stone Base, And Hot-Mix Paving at Airport

Excavation and Extensive Drainage System Included In Improvement to Field By Three Contractors

✦ PAVING operations at the new Cumberland, Md., Airport were recently completed with the laying of the last square yard of flexible-type surface, making available for use three runways, 5,775, 3,500, and 3,000 feet long, each 150 feet wide. The final phases of construction at the airport, which was a WPA project before the war, were performed by three contractors. The Grandview Co. of Mt. Vernon, N.Y., did the grading and drainage; M. De Matteo Construction Co. of Quincy, Mass., laid the sub-base and base course, and sublet the hot-mix asphaltic-concrete paving to the Cumberland Contracting Co. of Cumberland, Md. These contracts were financed by the Federal government and were under the supervision of the Civil Aeronautics Administration, the constructing agency.

Paradoxically, this 200-acre airport for Cumberland, Md., lies across the Potomac River at Wiley Ford, Mineral County, W. Va., since a suitable site could not be found on the Maryland side. Cumberland is an important railroad junction, and like cities of that type is subject to a pall of soot and smoke to which the B & O roundhouse located there is a generous contributor. Its river location is also subject to fog but, although the new airport is practically encircled by the north branch of the Potomac, the 730-foot elevation of the runways built on top of the bluffs is 140 feet above the normal flow of the river and higher than the average fog belt.

Located near W. Va. Route 28, the new flying field is only 4 miles from downtown Cumberland, and is reached by crossing first the abandoned C & O canal on an old narrow truss bridge and then the Potomac to Wiley Ford, W. Va., where the road winds uphill to the site. A new access road to the airport has been proposed which will cross both the canal and river on a long-span modern bridge, and shorten the time to and from Cumberland.

Preliminary Work

When the WPA folded up in 1942, considerable work had been done at the airport, including the grading and flexible paving of 4,200 feet on No. 1, the longest, runway which lies northeast-southwest, the prevailing direction of the wind. The WPA also completely graded the 3,000 feet of No. 3, the north-south runway, and the City of Cumberland let a contract to the Cumberland Contracting Co. to finish the black-top paving of this runway after the WPA discontinued work. No work had been attempted, however, on No. 2, the 3,500-foot east-west runway, and the areas between runways had not been graded. A small hangar with accommodations for six planes was erected near runway No. 1 and the field was used by planes that do not require runways of great length.

For its intended use as a commercial field, this Cumberland, Md., Municipal Airport had to be enlarged, so the CAA let a contract for grading the extension of runway No. 1 to 5,775 feet, constructing the 3,500-foot No. 2 runway, and grading for taxiways and the areas between the runways. Work on this $468,000 grading and drainage contract was started by the Grandview Co. in October, 1944, and was completed twelve months later in October, 1945. Anthony, James, and Dominick Mirabelli, members of the Grandview Co., all gave their attention to this job, with James Mirabelli serving as Superintendent.

Grading Contract

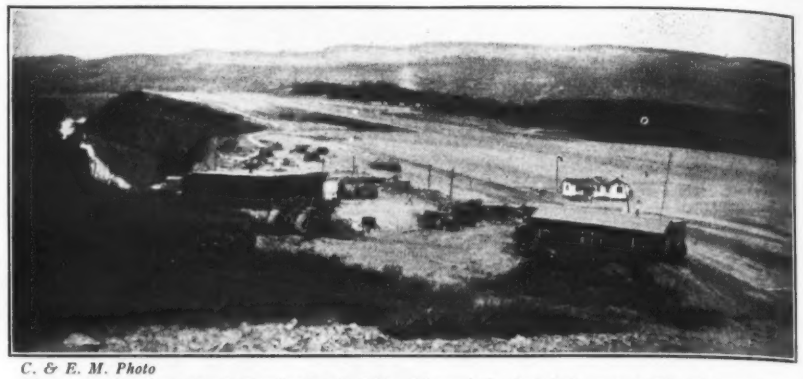
The ground at the airport is a combination of clay, shale, and some fine-grained sandstone, and in excavation the hard shale had to be treated as solid rock to be removed only by blasting. More than enough material was available at the site from the deep cuts which, in some instances of side-hill excavation, measured up to 90 feet in depth. Excess material was deposited in a location that may serve for another runway at some future date, and also for grading the proposed administration area, west of runway No. 1.

More than 250,000 pounds of Hercules and Atlas 40 per cent dynamite were used in loosening the shale. At first the contractor tried horizontal drilling but after ruining two No. 60 bits in drilling a 24-foot hole in the tough material, this method was discontinued and the conventional vertical holes, about 18 feet in depth, were drilled by four Ingersoll-Rand wagon drills powered by three 315-cfm compressors, two Ingersoll-Rand and one Gardner-Denver. Holes were drilled on an average of 5-foot centers, using 1¼-inch drill steel in lifts of 4, 8, 12, and 18 feet, while the sizes of bits decreased accordingly from 2¼ to 1⅞ inches. At this fairly remote location, as many as 262 holes were shot at one time. An Ingersoll-Rand Jackhamer was used to drill the holes for secondary blasting.

After the blasting, the material was dug out by three 2-yard shovels, a Northwest, an Osgood, and a Koehring, which loaded a fleet of rubber-tired earth-movers including six 16-yard bottom-dump Euclids, six 10-yard end-dump Euclids, and two rock-body end-dump 10-yard Macks. The average haul with this equipment was ½ mile.

C. & E. M. Photo

Blasted shale is loaded by a Northwest shovel to a 16-yard bottom-dump Euclid at the Cumberland, Md., Airport.



C. & E. M. Photo

The recently improved Cumberland, Md., Airport is located across the Potomac in West Virginia, on a bluff 140 feet above the river. In the foreground are the tractor and machine shops and equipment yard of the grading contractor.

Material other than shale, including the clay overburden, was first loosened by a LeTourneau Rooter pulled by a Caterpillar D8 tractor, and then moved by five Super C 12-yard Tournapulls, and seven LeTourneau 12-yard and three LaPlant-Choate 30-yard scrapers, all pulled by Caterpillar D8 tractors. The average haul by the Tournapulls was ½ mile, while the scrapers averaged 1,500 feet.

In starting one of the big fills 120 feet high, a haul road with a grade as steep as 30 per cent was experienced, which lessened of course as the fill was built up. For every rise of 30 feet the fill has a bench of 15 feet. During the placing of the material the shale was mixed with the earth and spread by five Caterpillar D8 tractor-dozers. In this way better compaction was obtained than if the two different types of material were spread in separate layers, the shale in layers of 3 feet and the earth in layers of 8 inches. Another advantage was a smoother haul road with fewer jagged rock edges.

The material was compacted not only by the constant movement of heavy equipment over it but also by two sheepsfoot rollers pulled in tandem by a Caterpillar D7 tractor. Final shaping was achieved by two Caterpillar power graders, a No. 12 and a No. 112, which also kept the haul roads in good condition. With this equipment and a force of between 50 and 60 men, including 6 mechanics, an average of 6,000 cubic yards was moved in a 10-hour day.

Airport Drainage

The 150-foot-wide runways, with grades varying from 0.2 to 1.0 per cent, have a slope from the center line of 1 per cent each way to a grass landing area at least 175 feet wide on each side. The 50-foot taxiways have a similar pitch. Drainage of subsurface water is taken care of by an 8-inch open-joint concrete pipe line, 2½ feet off each edge of the runways, and laid with an average cover of 3 feet of porous backfill to a point above the subgrade. These runway drains extend to catch basins located throughout the field which also serve to drain off surface water. From these field outlets the water is conducted to the perimeter of the airport where grouted spillway ditches empty into the river or nearby swamps. Drainage ditches were dug by a Bay City truck shovel equipped with a ½-yard trench hoe, and a Bay City Model 45 crawler-type shovel using a ¾-yard trench hoe.

On all fills over 3 feet in height a 2-foot-high x 3-foot-wide berm was built around the edge to prevent surface water from running down the slopes and causing erosion, while in cuts erosion is prevented by a 2-foot cut-off ditch on top of the bank and another 2-foot ditch at the bottom to lead off the water. At the toe of one of the big fills adjacent to the river, riprap was laid for a linear distance of 1,300 feet to a height of 15 feet which is the high-water mark of the Potomac at that point.

Another drainage problem was raised by the unusual situation of having a tunnel carrying a single-track line of the Western Maryland Railroad lying 100 feet below the surface of runway No. 1. At right angles to the runway, the tunnel, as it leaves the vicinity of the airport on the south, passes through a deep cut which was in danger of being filled with surface water from the new airport since during the construction two natural ravines were formed through which drainage would naturally flow. This situation was overcome by leading the water from these ravines through 400 feet of 16-inch Transite pipe and 100 feet of grouted-riprap gutter to a swamp area beyond the railroad cut.

At several locations, pipe connections had to be made to drainage pipe laid by the WPA. When this pipe was originally laid it was not closed off with bulkheads and as a consequence many sections were completely filled with dirt. The task of cleaning these pipe lines fell upon the City of Cumberland Sewer Department which sent a five-man crew and a Flexible Sewer-Rod Equipment Co. outfit to the airport, and sections about 60 feet long were cleaned out at a time.

Shafts were dug over the pipe at each end and a long sectional ⅜-inch rod, or "snake", was pushed through the 24-inch concrete pipe. After the rod was through, a ½-inch steel cable was attached to it and also pulled through and fastened to a 5-ton hand winch set up over the shaft at each end of the pipe. Special digging buckets, shaped like a projectile, were then attached to the cable and pulled through the pipe. The bucket was first pulled through with its pointed end ahead, and then its direction was reversed and the digging began, aided by teeth at the lower half of the open end of the projectile-like bucket. Two men worked at each winch, set up on four legs at each side of the shaft, while the fifth man down in the hole emptied the bucket and put on larger ones as the size of the opening through the pipe increased. Starting with a 6-inch-diameter bucket, this was subsequently changed to 8, 10, and finally to a 12-inch size. The digging was always done in the same direction.

Equipment Maintenance

On a little knoll at the north side of the field the Grandview Co. set up its yard for maintenance of equipment. An important item was the welding unit mounted on an International truck, consisting of the usual oxy-acetylene set and a G-E 300-amp electric welder driven by a Continental 4-cylinder gas engine. Either field or shop welding was done with this outfit.

A wooden building, 40 x 30 feet, on one side of the yard was half machine shop and half stock room. The storage area was enclosed by a wire fence and contained large replacement parts for the earth-moving equipment and also spare tires. At the rear of the half given over to machine work was a

(Continued on page 53)

Widening Trench Dug At A Mile-A-Day Rate

Labor Shortage Overcome By Mechanized Equipment; 16.6-Mile Contract Also Included Concrete Patches

✦ ALTHOUGH labor was scarce in Indiana last summer, the McMahon Construction Co. of Rochester, Ind., overcame that shortage on its 16.6-mile concrete-patching and widening contract with the judicious use of plenty of mechanized equipment for every possible operation. So well suited was the equipment for the work at hand that a mile of trench, 3 feet wide at the edge of the pavement, was consistently dug in a 10-hour day, and a strip of concrete, 2 feet 3 inches wide, was poured to an average length of 2,400 feet in the same number of working hours. At times a peak of 5,000 linear feet of concrete widening was done in the regular working day.

The road thus improved is State Route 34 beginning at the Marion-Hendricks county line, 10 miles out of Indianapolis, and continuing in a northwesterly direction, like one of the spokes on a great wheel which has the capital city for its hub, to the easterly limits of Jamestown. The contract for this 16.6 miles of concrete patching, including widening on both sides of the existing pavement, was awarded by the Maintenance Division of the Indiana State Highway Commission to the McMahon Construction Co. on its low bid of $135,985.

Concrete Patching

Before any widening was done, sections of the 18-foot concrete pavement that had cracked or disintegrated were first removed, and new concrete poured in its place. The 9-7-9-inch concrete pavement had been laid in 1930 and reinforced with a marginal bar placed a few inches in from each edge at mid depth of the slab. There were no joints in the old pavement which was flanked on each side by 6-foot shoulders.

The sections patched were mostly small in size, although an area of 2 square yards was fixed as the smallest segment to be opened up. The Project Engineer determined where the repairs were needed, and those areas were outlined with a 2-inch stripe of yellow paint and given a number which was also painted on the pavement within a yellow circle. As much as possible, the patch outlines were held to straight lines, and were generally made at right angles to the road. Only half the width of the road was worked on at a time so that traffic was maintained on the other half.

Holes were drilled on approximately 3-inch centers along the outline of the patch by Ingersoll-Rand Jackhamers using 1-inch drills, with power supplied by a Jaeger 105-cfm portable air compressor. Ingersoll-Rand pavement breakers were then used to cut out the rest of the concrete, while the steel marginal reinforcing rod was burned off with an oxy-acetylene torch. If the material in the subgrade was found unsuitable as a foundation for the new 9-inch concrete patch, it was removed and a layer of sandy-gravel borrow meeting the following gradation specifications was substituted:

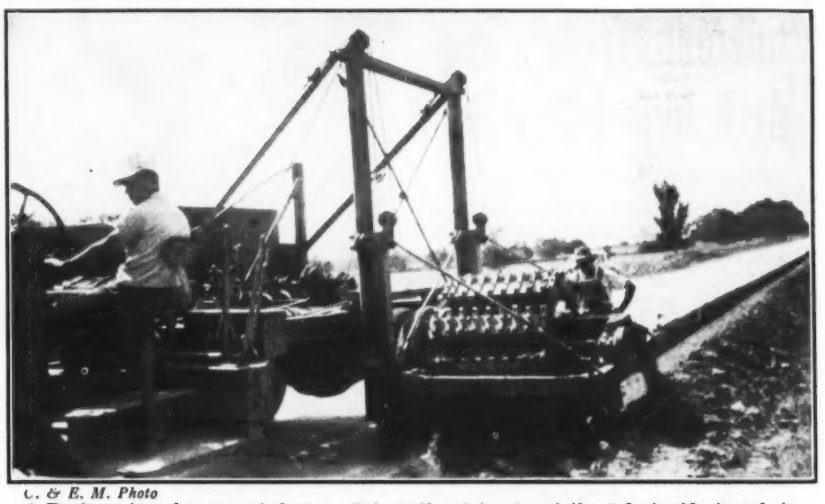
Sieve Size	Per Cent Retained On
2-inch	0-5
No. 4	0-65

The concrete rubble was removed, neatly piled up by the contractor, and used by employees of the Maintenance Division of the Highway Commission where needed on fills and washes, or the old concrete was gathered up by farmers in the vicinity who could find a use for it. The holes were then filled with concrete brought to the job in Jaeger 4-yard truck-mixers mounted on Mack trucks. The concrete was struck off and floated by hand, and cured with Cem-Cure membrane compound. By the use of high-early-strength cement in both patching and widening, the concrete patches could be opened to traffic in 72 hours, after the concrete was tested by breaking a beam from the pour to see that it had developed a flexural strength of 550 pounds to the square inch.

Ready-Mixed Concrete

Concrete used on this job was purchased from the Ready-Mix Concrete Corp. of Indianapolis which set up a batch plant near a siding of the C. C. C. & St. Louis Railroad at Pittsboro about half way from each end of the job. The mix used was about 1:2:3 proportion, with the cement ratio 1.5 barrels to the cubic yard. Sand and two different

(Continued on next page)



C. & E. M. Photo

A Buckeye trencher mounted on an International truck cut the 3-foot-wide trench to widen 16.6 miles of Indiana State Route 34.

EXTRA WALLOP *for Faster* { BREAKING / SHEETING DRIVING / SPIKE DRIVING

Short Front Heads for Spike Driving; interchangeable on tool.
Standard Front Head—with Latch Retainer for general demolition work.
Sheeting Driver Head—interchangeable with Standard Front Head.

with Thor

PAVING BREAKERS

YOU CAN USE the extra power of Thor Paving Breakers to do many *different* jobs. As hard-hitting demolition tools they break concrete, rock and ice; cut asphalt; tamp dirt; dig clay and hard pan. Used with Sheeting Driver attachment, they quickly drive wood or steel sheeting as thick as 3 inches. Another simple change of the front head and they become heavy-duty Spike Drivers.

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On *every* job, Thor Breakers are bonus makers. Thor's exclusive short-travel, tubular valve gets more work from *all* the air to drive a reversible, block-type piston in harder blows. Air cushioning of the piston in the cylinder—plus perfect timing and balance—provide smooth operation for easy handling. Air vents in the sturdy back head keep the handle remarkably cool. Rugged construction means long-life and low maintenance cost. You can get these benefits on your own jobs now . . . ask your nearby Thor distributor.

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Widening Trench Dug At A Mile-A-Day Rate

(*Continued from preceding page*)

types of gravel were used in the batch and graded as follows:

Sieve Size	Per Cent Retained On		
	No. 2 Gravel	No. 5 Gravel	Sand
2½-inch	0	.....	.....
2-inch	0-5	.....	.....
1½-inch	.....	0	.....
1-inch	80-100	0-15	.....
¾-inch	95-100	15-40	.....
½-inch	98-100	40-70	.....
No. 4	.....	90-100	5
No. 8	.....	96-100	5-20
No. 30	.....	.....	50-80
No. 50	.....	.....	80-95
No. 100	.....	.....	95-100

The coarse aggregate contained about 40 per cent of No. 2 gravel and 60 per cent of No. 5 gravel. The concrete was mixed one minute at the plant, and then transferred to the trucks which agitated the mix on the way to the site, an average distance of 5 miles. In no event was the concrete permitted to remain in the truck-mixers longer than 45 minutes.

Road Widening

Widening operations began with a Caterpillar No. 12 power grader leveling off the 6-foot shoulders of the road and then scarifying a 30-inch strip alongside the pavement. This insured good working conditions for the Buckeye trenching machine which followed, cutting a trench 3 feet wide and 9½ inches deep. Although the strip of concrete that was added is only 2 feet 3 inches wide, the extra 9 inches of trench width was needed for placing the road forms.

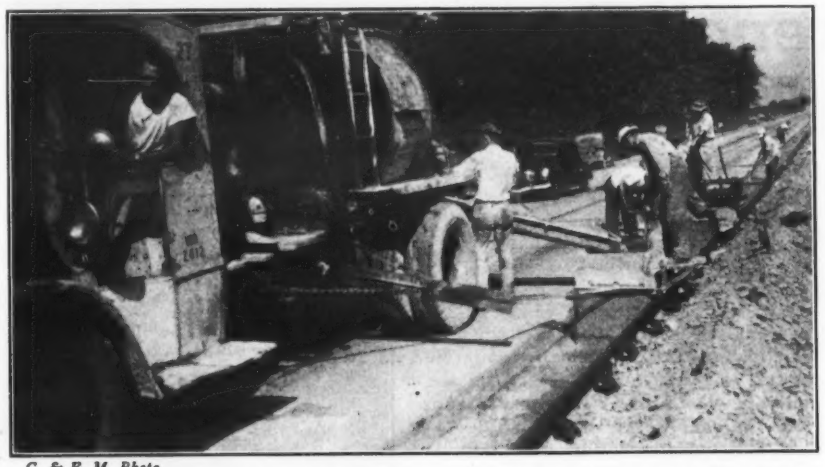
The trencher was geared to the drive wheel at the rear of an International truck which had a special power take-off and an extra transmission. The truck had four rubber-tired rear wheels, and drove slowly along the edge of the pavement while the trenching machine projecting beyond the pavement made its cut. The dirt was thrown out from a conveyor belt at the center of the hub to form a windrow along the outside of the trench. This machine with two operators averaged a mile of trench in a 10-hour day.

A single row of Heltzel forms was then set in the trench by hand, with about 3,000 feet of forms always kept ahead of the paving; the total footage of forms on the job averaged around 6,000. A crew of five men set the forms, after which the space between was fine-graded by pulling a rectangular metal box over the grade. This grader was 5 feet long x 27 inches wide, just the width of the trench, and was equipped with three blades, two placed diagonally and one horizontally, which removed all excess dirt. This was shoveled out by hand by a couple of laborers who went along with the grader. It was pulled slowly along by a truck which had been equipped with a specially made drawbar projecting from the side so that the grader was always pulled in a straight line as the truck proceeded along the pavement. At the back of the grader was a concrete roller, 24 inches in diameter x 24 inches long, which compacted the subgrade as it was towed.

Concrete Strip

The forms were then oiled and the subgrade wet down, if necessary, with water from a 1,000-gallon tank mounted on an International truck. The tank was filled from the hydrants in towns through which the road passes, and the water was delivered by gravity through a hose to the grade.

In pouring the added strip, a fleet of seven Jaeger 4-yard truck-mixers was kept busy chuting concrete into the forms. These trucks were all fitted with a special horizontal drawbar which pulled, by a chain, a steel-sided spreader box, 3 feet long x 26 inches wide,



C. & E. M. Photo
Concrete for widening 16.6 miles on State Route 34 in Indiana was delivered by Jaeger truck-mixers on Mack trucks and chuted into a spreader box.

with plates extending from within 2 inches of the grade on each side to a level of 18 inches above the pavement. The concrete was chuted from the rear of the trucks into this box, thereby regulating the flow of material. The spreading was always well under control by means of the box which had skids on each side for riding the form rail on one side and the edge of the slab on the other. The long side plates also acted like spades along the sides of the strip to prevent honeycombing in the concrete.

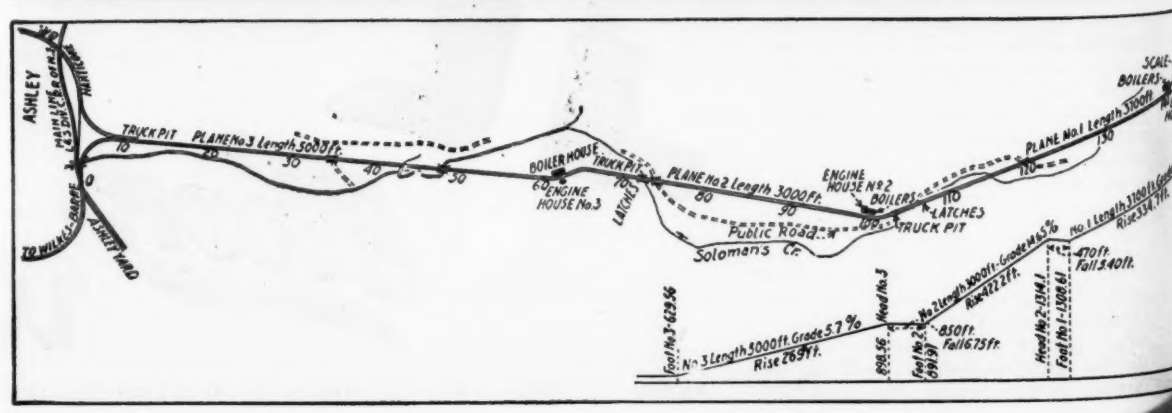
The spreader box was made by the Ready-Mix Concrete Corp. which also equipped its trucks with the drawbar attachment for pulling it. The bar was made of two angle irons welded together, and fitted into a framework secured to the truck chassis.

Following the spreader box was a Heltzel finishing machine with a single 36-inch screed, originally used for finishing sidewalks but rebuilt for this purpose. Two hand finishers with long-handled bullfloats, 48 x 6 inches, then leveled off the concrete with sweeping motions from the existing pavement out to the edge of the new strip, after which a soft fiber broom was pulled lengthwise along the surface of the concrete. A third finisher then rounded off the edges of the new lane, using a ¾-inch-

(*Concluded on next page, Col. 4*)

Hauling 27,972,495 tons of freight ov

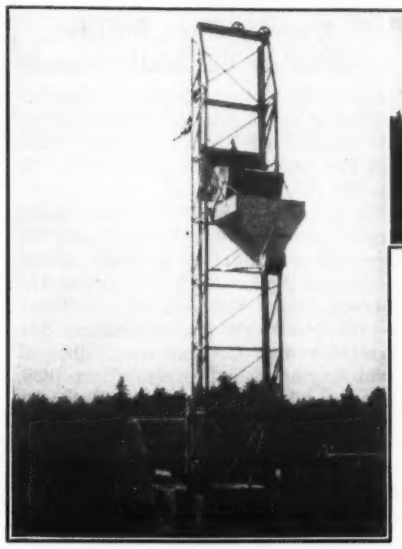
Loaded cars hoisted
as barney goes down
When one barney is hauling a load up over one set of tracks, the other is going down to enter the pit and come up behind another load on the track adjoining. Note the simple arrangement of pulleys which support the hauling cable. Notice, too, the tail rope, 1½" diam, which is attached to the rear of each barney. Kept taut by sheaves, bullwheel and counter-weights, it equalizes any slackness in the hauling cable. Another view, up this incline, is shown on the opposite page. There the camera gives you a perspective of the slope. The rise is 422.2 ft. in 3,000 ft. —a 14.65% grade.

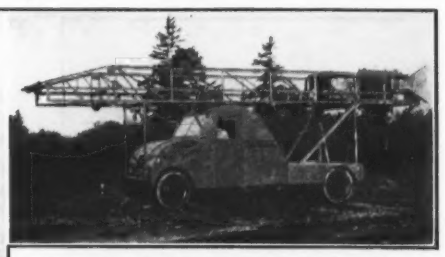


Hoist Tower Mounted On Truck for Mobility

A new hoisting tower, the Towermobile, is designed for elevating concrete or other materials, and for ready mobility between jobs. Mounted on a special truck, the unit has a road speed of 45 mph, and is ready for operation within 10 minutes after arrival at the job site.

The primary tower on the Towermobile is 35 feet high, and folds over on the truck for travel. Extension units, each 10 feet long, may be added as desired, to increase the height. The tower hopper holds 1½ cubic yards of concrete, and the elevating bucket, 1 cubic yard. The latter can take concrete direct from truck-mixers on either side of the tower. It is possible to remove the bucket and hopper and replace them with a 6 x 6-foot elevator platform for raising other material or equipment. Power for the Towermobile comes from the truck engine, through a take-off. All operations are mechanical, and are controlled by one man from within the cab.





The Towermobile for concrete placing and other material-hoisting jobs is a truck-mounted unit powered by the truck engine and easily folded over the truck for travel.

Further details may be secured from Mixermobile Manufacturers, 6855 N. E. Halsey St., Portland 16, Oreg., which announces that deliveries of equipment are now possible within 30 days after receipt of orders.

Get New Wellman Posts

The election of Vice President A. J. Lichtinger to the Board of Directors and the appointment of W. C. Swalley as Vice President in Charge of Sales have been announced by the Wellman Engineering Co., Cleveland, Ohio.

Widening Trench Dug At A Mile-A-Day Rate

(Continued from preceding page)

radius tool along the old pavement and on the outside edge. As on the patching, the curing agent was Cem-Cure.

Employing a force of about 35, the average length of pour by the contractor in a 10-hour day was 2,400 feet, while one day, when the truck haul was shorter, 5,000 feet of widening was done. The force was divided so that 15 men, including equipment operators, prepared the subgrade; 5 men set forms and another 5 removed forms and moved them ahead; and the remaining 10 were in the concrete gang.

After the forms were taken out, backfilling was done by the power grader, the dirt being placed in two layers, with each course rolled by the wheels of a truck loaded to at least a 4-ton weight. After this material was filled in and compacted up to the level of the pavement, excess dirt was spread on the shoulders and slopes as long as it did not interfere with the drainage ditches. At certain locations, such as in cuts, where such disposal was impossible, the earth was moved along the shoulders by the blade on the grader until suitable places were found for wasting the extra material.

Items and Personnel

The major items in this 16.6 miles of concrete patching and widening in which the pavement width was increased from 18 to 22½ feet included:

Concrete patching	750 sq. yds.
Concrete pavement	43,220 sq. yds.
Special subgrade borrow	175 sq. yds.

Everett Best was Superintendent for the McMahon Construction Co. and J. A. Booe was Project Engineer for the Indiana State Highway Commission. The improvement was a project of the Maintenance Division which is headed by Charles T. Miser, Superintendent of Maintenance.

New Tyson Executives

The appointment of P. W. Brown as Director of Production has been announced by the Tyson Bearing Corp., Massillon, Ohio. Until recently the Director of Manufacturing for Wright Aeronautical Corp., Mr. Brown will serve on Tyson's Board of Directors and Executive Committee. He was a member of the Automotive War Production Council during the war, and was Chairman of the Manufacturing Coordinating Board of all firms making Wright wartime products.

Paul J. Bastian has been named Vice President in charge of manufacturing by Tyson. Until recently he was Production Manager for the Watson Flagg Machine Co., Paterson, N. J., and was formerly affiliated with the Wright and Curtiss airplane firms.

Plastic Slide Rule

Precision in plastic is said to be a reality with the development of a new 10-inch Universal slide rule. Known as the Plas-Ten, the new instrument has razor-sharp easily read graduations, and is supplied with a heavy leather case. Limited quantities are available.

For further details, address the Frederick Post Co., Box 803, Chicago, Ill., and mention this news item.

Welding Consultant

The educational work of the Lincoln Electric Co., Cleveland, Ohio, is to be supervised by R. H. Davies, the firm has announced. Mr. Davies will act as consultant on the use and design of welded steel in manufacturing and structural construction.

ght over the famous Ashley Planes

AMERICAN EXCELLAY PREFORMED TIGER BRAND Wire Rope sets records for top performance over 100 year period

WILKES-BARRE in the heart of the Anthracite field is three miles from Ashley, Pa., where the Ashley Planes are located. From Ashley to the mountain top it is 1,000 feet up. The grade of the famous Ashley Planes is such that a locomotive cannot negotiate it economically. The alternate route around the mountain is 12.41 winding miles of heavy grade over which a locomotive can haul a small tonnage train at slow speed. With brilliant foresight the engineers who planned the Ashley Planes 100 years ago, chose to do it the hard way. They proposed to haul freight cars up Solomon's Gap, on three inclined planes—*by wire rope.*

As revolutionary as this project must have been in 1843, the remarkable fact is that repeated tests prove it to be more economical than the longer route, even today. Under twenty-four hour operation, hauling an average of one million tons of coal, oil and mixed freight per month—this cable-hauled railroad equipped with about 100 tons of wire rope reduces transportation costs very materially.

Best visualized by the profile reproduced at left, the Ashley Planes, now operated by the Central Railroad of New Jersey, consist of three inclines of 5.7%, 14.65%, and 9.28% grade respectively. The total rise is 1,035.9 ft. up which 35 to 45 cars are hauled hourly at from 12 to 30 mph.

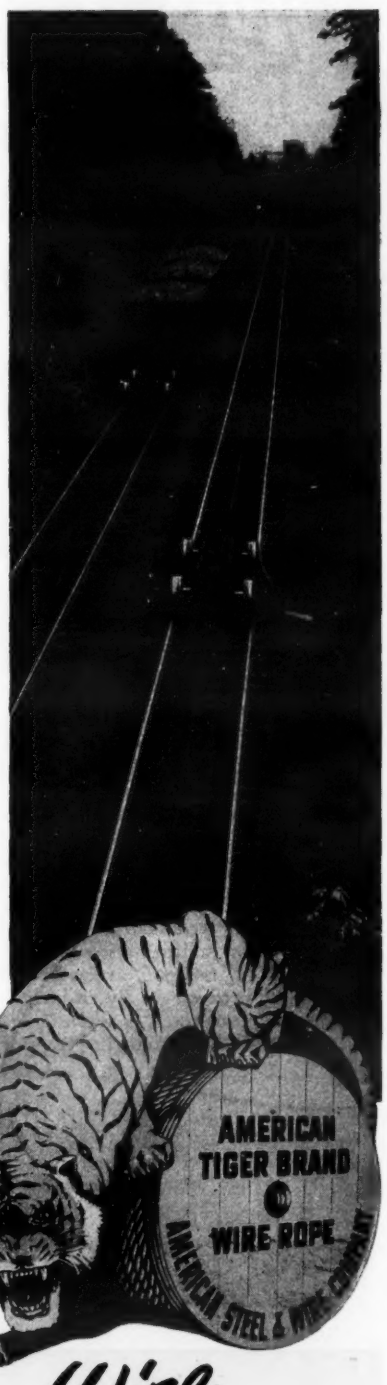
Each plane is a self-contained unit. It consists of a double track (with a truck pit at the foot of each track), and is equipped with its own hauling cable and two cable trucks or "barneys". A power house with hoisting engine at the head of each plane furnishes the motive power.

The hauling cable (2½" diameter on the top and bottom planes, 2¾" diameter on the middle plane with the heaviest grade) passes from one barney up the plane over supporting pulleys, then around 24-ft. diameter twin traction drums, then out through the bottom of the power house and back to the barney on the parallel track.

Close check is kept on the life of these hauling cables, and is measured in terms of tonnage hauled. We believe it significant that during the years when the planes were under full wartime capacity operation, and the equipment was being worked to the limit, American TIGER BRAND Excellay Preformed Wire Rope ran up the highest tonnage performance ever recorded! 19,804,642 tons on the No. 2 plane; and 27,972,495 tons on the No. 3 plane.

TIGER BRAND Excellay Preformed Wire Rope installed on the No. 3 plane in November 1943 has to date hauled 27,972,495 tons and is still in excellent condition. The performance of these ropes continues to break previous records.

These figures — substantially better than the former best with other wire rope used—speak for themselves as proof of the superior stamina, greater ruggedness and better service TIGER BRAND delivers, wherever used.



AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
Tennessee Coal, Iron & Railroad Company, Birmingham, *Southern Distributors*
United States Steel Export Company, New York
UNITED STATES STEEL

USS AMERICAN TIGER BRAND WIRE ROPE UNITED STATES STEEL

Excellay Preformed

U·S·S AMERICAN
TIGER BRAND *Wire Rope*

The Tournapull-drawn LP Carryall scraper at the left is equipped with the new-size 21.00 x 24 tires, while the same unit on the right carries the smaller 18.00 x 24's formerly used.

Tires Standardized On LeTourneau Units

The standardization of tire equipment on Tournapull-Carryall scraper combinations has been announced by R. G. LeTourneau, Inc., Peoria, Ill. Previously fitted with tire sizes 18.00 x 24, the Carryall is now being produced with larger 21.00 x 24 tires. This change permits the use of lower pressure to transport maximum loads. The flotation contact area of the tires is 24 per cent greater, rolling resistance is reduced, and scraper clearance increased 4 inches. Interchangeability between front and rear tires is now possible, worn traction tires being exchangeable with scraper trailing tires.

Carryalls originally fitted with the smaller size of tire can be converted to the new tires with little trouble, the firm says. The scraper's wheel and axle support leg must be replaced and other minor changes made to effect the change-over. Full information on this operation may be secured from LeTourneau distributors.

New Maine Distributor

The designation of the Southworth Machine Co., Portland, as a distributor in Maine has been announced by the Hewitt Rubber Corp. The Southworth firm, one of the largest New England machine shops, expanded into the equipment sales field recently.

In addition to Hewitt hose, and conveyor and transmission belts, it will distribute tractors, road machinery, power shovels and cranes, compressors, wire rope, and rock crushers. Spare parts will be carried and a service department maintained.

F. T. Crowe, Dam Builder, Dies at 63; Built Shasta

Frank T. Crowe, General Superintendent of construction at Shasta Dam and builder of eighteen other dams, died February 26 at Redding, Calif. He was 63.

Mr. Crowe spent almost the entire 20-year period from 1905-25 in association with the Bureau of Reclamation, serving on the Lower Yellowstone, Arrowrock Dam, Flathead, Tieton Dam, and other projects, and as General Superintendent of Construction, Office of Chief Engineer, at Denver. After 1925, as the field representative of various contracting firms, he directed construction of Boulder Dam, Copper Basin and Gene Wash Dams, Parker Dam, and since 1939, Shasta. He finished Boulder in 5 of the allotted 7 years and, through special concrete pouring methods, completed Shasta 25 months ahead of schedule.

Especial recognition was given Mr. Crowe's achievements in 1944 when he was elected an honorary member of the American Society of Civil Engineers, and last year when The Moles gave him their annual award for "his skill, ingenuity, and engineering ability in the construction of vast public works, notably in the field of the world's highest and deepest dams". In 1935, his Alma Mater, the University of Maine, made him an Honorary Doctor of Engineering.

Black and White Prints

There is no cure-all for post-war problems, the Charles Bruning Co. says in a new broadside, but Bruning black and white prints can help solve some of them. The bulletin details some of the features of black and white prints and reproductions of drawings and tracings. Various Bruning printing and developing machines are shown.

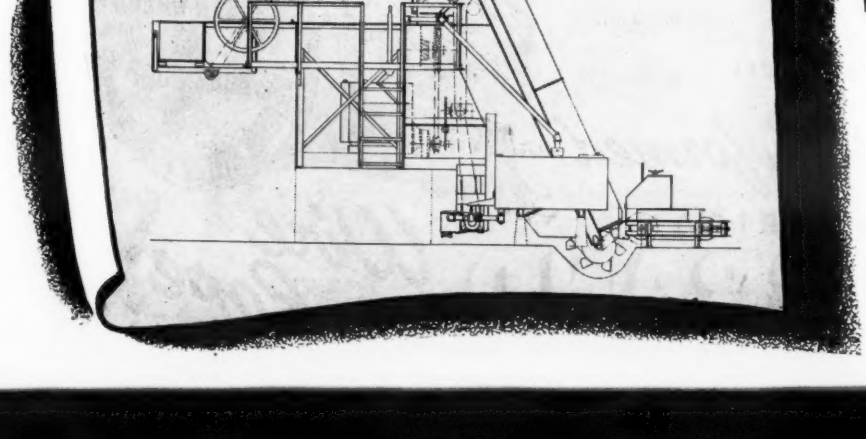
Copies of the broadside, Form A-1020, may be secured on mention of this notice. Write the Charles Bruning Co., 4754 Montrose Ave., Chicago 41, Ill.

HERE'S the asphalt mixing plant that will really put money into your pockets on all small and medium sized jobs. 25 to 30 tons an hour—150 to 250 tons per day—of uniform, thoroughly coated and mixed aggregate are a cinch for the Patchmaster. Set it up as a permanent plant wherever you have a regular demand for patching material. Keep it on pneumatics if your jobs are widely scattered. Either way you'll find it is the handiest, most profitable maintenance plant you ever saw. You'll be amazed at its accuracy, economy and high capacity. By adding a drier you can handle hot mixes as well.

Ground-level charging hopper assures quick, easy loading. Truck-high pug mill discharge eliminates troublesome delivery conveyor belts. Every part is built to Cedarapids high quality standards for long life, trouble-free operation and low cost.

The Patchmaster is the ideal plant for contractors, townships, counties, cities, state highway departments, large industrial plants or anyone who wants a low-cost, low-priced asphalt mixing plant for their smaller black top jobs. See your nearest Cedarapids distributor or write for Bulletin PM-1.

IOWA MANUFACTURING CO.
Cedar Rapids, Iowa, U.S.A.



Cedarapids — Built by IOWA

THE IOWA LINE
of Material Handling Equipment Includes
ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
BUCKET ELEVATORS
VIBRATOR AND REVOLVING SCREENS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS—TRAPS
PORTABLE POWER CONVEYORS
PORTABLE STONE PLANTS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

THRU STOP TRAFFIC

Buy METAL SIGNS *Now!*

Widely used CATAPHOTE Metal Reflector and plain Signs now available . . . for all types of traffic-control messages. Long-life, low-cost illumination assured by use of Cataphote Reflector Buttons . . . for day-and-night effectiveness! No moisture condenses . . . no yellowing with age . . . brilliance guaranteed 3 years. Check your needs—order today!

CATAPHOTE CORP.
TOLEDO, OHIO

Rural County Handles Maintenance Problem

Gravel Road Work Done With Modern Equipment On $25,000 Budget; Sound Planning Helps

✦ HOW can a county engineer maintain 500 miles of rural road in usable condition winter and summer on an annual budget of only $25,000? Many a county official, charged with the responsibility of keeping his county road system in good repair, would like to have the answer to that question.

Ordinary problems become headaches. Power graders and tractors are so few in number that the county engineer can count them on the fingers of one hand. Streams overflow. When they do, erosion washes out whole sections of farm-to-market road. While this is being repaired, a farmer in some other part of the county is clamoring for a re-shuffling of equipment, so a piece of road near his place can be graded. The man-power pool consists of a single type of help. If the county court allows labor to be hired, the road builders get rural-minded farmers instead of trained motor-grader men.

In the central part of the United States are several hundred such counties which each year face this kind of issue. Among them is Osage County, Mo. Its Road Department, consisting of County Judges, Road Overseers, and the County Engineer, have worked out a system whereby almost all the money in the road-building budget is actually expended on the upkeep of roads.

Osage County has an area of 593 square miles, with 12,375 persons living within its boundaries. The county seat is Linn, situated in central Missouri about 100 miles west of St. Louis. The largest village in the county is Chamois, with a population of 675. For the most part, Osage County is agricultural, with few industries. The people who traverse its 580 miles of county-maintained roads are farmers who bring produce to market, rural mail carriers, schoolteachers, and a few itinerant travelers. So vital is the necessity for every mile these people travel that the resulting problems in connection with road upkeep are real, and just as acute as those in the metropolitan counterparts where the nation's big cities are situated.

Scattered over Osage County are numerous streams which carry run-off water into the Missouri River. Although many of these creeks empty into the Osage or Gasconade Rivers on either side of the county, the rain and snow run-off all eventually reaches the Missouri and Mississippi, for this county is a part of that great watershed. The flooding of these streams, which usually occurs in the spring but can happen anytime, causes the most damage and the biggest problem Osage County's Road Department must face and solve.

Low-Level Culverts

The terrain is hilly, with rolling contours and valleys. Many of the county roads follow the stream valley floors. Some cross the streams on submerged low-level culverts which this County has developed, and the historical lore of the region is rich with tales of how many an errant farmer urged his team through swirling flood water, only to overturn his wagon, lose the team, whatever staple supplies he was bringing from Chamois or Linn, and in at least a score of instances his own life.

To take care of the crossings, the County developed quite a number of years ago concrete structures which permit traffic to cross the streams during all but periods of extremely high water, and which also permit the stream to flow unobstructed through the structure. These crossings are ordinarily built in July, August, or September, when the water is low. The stream is either by-passed around parts of the concrete as work progresses, or if the volume of water is low the stream is dammed while the concrete is placed. The structure is a simple piece of mass concrete, well anchored at the flood

(*Continued on next page*)

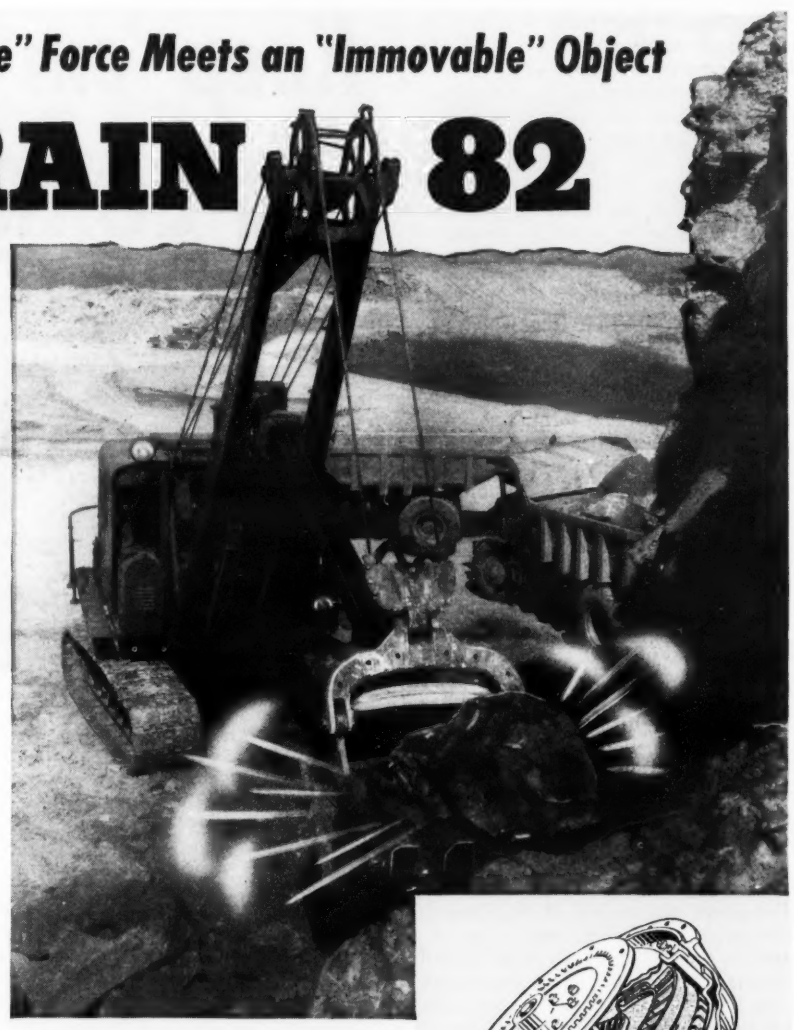
C. & E. M. Photo
An Adams pull grader towed by an International tractor relocates and raises the roadbed of a county highway near Linn, Osage County, Mo.

For 69 Years Builders of Fine WHEEL BARROWS:
AMERICAN
STEEL SCRAPER CO.
Sidney, Ohio
Watch for Post-War Models

When an "Irresistible" Force Meets an "Immovable" Object

A LORAIN 82

"Rides with the Punch"



When the big dipper at the end of a powerful 2-yd. Lorain-82 slams into a big boulder or rigid rock strata, something is going to give. Usually it's the rock, but the terrific impacts and shocks can be mighty unhealthy to a shovel and its "innards".

A Lorain-82 Rock Shovel is engineered throughout to take these beatings. What's more, it cleverly "*rides with the punch*"!

Why? Because a hydraulic coupling (see diagram) acts as a shock absorber to cushion blows and shocks, to protect the cables, boom and power mechanism. Lorain engines can't stall in rock or any other digging! Their action is smooth as oil.

Your nearest Lorain distributor can explain the numerous mechanical advantages that insure the long life, low repair and maintenance cost, and the operating speeds which have made Lorains so predominant in brutal rock work.

Thew-Lorain was first with the Hydraulic Coupling which not only delivers tremendous digging power, but provides defense mechanism to cushion and absorb return wallops and strains.

Get the Facts and You'll Get a...

Reg. Trade Mark
thew-Lorain
CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

Rural County Handles Maintenance Problem

(*Continued from preceding page*)

mark, with formed drains at the low-water line to take care of the normal summer flow below road elevation.

Concrete is mixed to State Highway Department specifications for Class B material, insofar as possible, and placed well ahead of the freezing season. On some of the larger streams, 6 x 8-foot concrete box culverts with 6-inch reinforced walls and an 8-inch deck have been placed in recent years.

Good Gravel Available

Osage County abounds in rounded red alluvial gravel, and this material has proved to be the best surfacing for the county roads from the standpoint of economy and permanence. It is found in all the stream beds, and seldom, if ever, do gravel hauls exceed 5 miles. The County handles thousands of cubic yards of gravel each year in its resurfacing and upkeep program, and one of the township road districts is now in the process of swapping a used Caterpillar No. 12 motor grader for a new Caterpillar D4 tractor with a Trackson Traxcavator. This loader will do the work of twenty laborers, according to County Clerk Allan Curtis, and should permit much more gravel to be placed than was the case prior to this time.

New construction has been limited during the war to the relocation of roads through flooded creek districts. These sections were only a few hundred feet in length and were almost negligible. The people who administer the expenditure of money for the roads in this county have to spend it wisely, and since they are so accessible to the county taxpayers who do not hesitate to speak their collective piece on almost any occasion, the maintenance of existing facilities takes top priority.

At the time the County Road Department was visited for CONTRACTORS AND ENGINEERS MONTHLY, county forces were busy east of Linn, the county seat, relocating a section of the Linn-Loose Creek road where it winds through a watershed. The little stream, so small it has no name, flooded during a late fall rain. The road was badly eroded and debris was strewn all over its surface. Traffic had been halted through this section for several days, and the same situation had occurred in that district for years.

Persistent petitioning of the County Court by local residents had at last resulted in a work order to relocate and raise the road adjacent to the right bank of the stream. The work was done by an Adams Model 104 pull grader, towed by an International TA-40 tractor. It is one of three such machine combinations owned by this County, and is used wherever extremely heavy grading must be done.

Clay and gravel was worked out of the side of a hill by the tractor and grader, and moved in successive passes to place it about 50 feet aside from where the old road ran. In this manner the elevation of the old road was brought up 5 feet to put it beyond the reach of the stream. Two laborers and the Road Overseer of the district, John W. Nilges of Linn, were busy keeping the fill clear of roots and other foreign matter. Compaction was achieved only by the tractor and grader, but a topping of alluvial creek gravel was planned to take care of the surface during normal spring settlement.

"We will probably use some of the bigger rocks we've thrown aside here to riprap the new fill and protect its sides from the creek," Mr. Nilges said.

Equipment in Use

Osage County owns and operates the following road machines:

1 Adams Model 511 motor grader
2 Caterpillar No. 12 motor graders
3 International TA-40 tractors with Adams 104 pull graders
1 Caterpillar motor grader now being traded in for a new Caterpillar D4 tractor with Trackson Traxcavator
2 Ford 2½-cubic-yard dump trucks.

The County does not operate nor maintain an equipment repair garage. The road overseers, many of whom operate their own machines, are responsible for their care and upkeep. They take care of fuel, lubrication, and normal minor operating repairs. There have been few instances of major repairs to the motor graders, but if and when those are necessary they are taken care of by the Caterpillar or Adams agencies in Saint Louis, only 100 miles away.

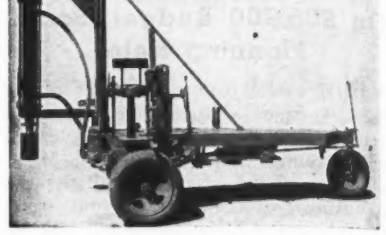
Organization

About half of Osage County is divided into regular township road districts, while the remainder of the county is composed of sixteen special

(*Concluded on next page*)

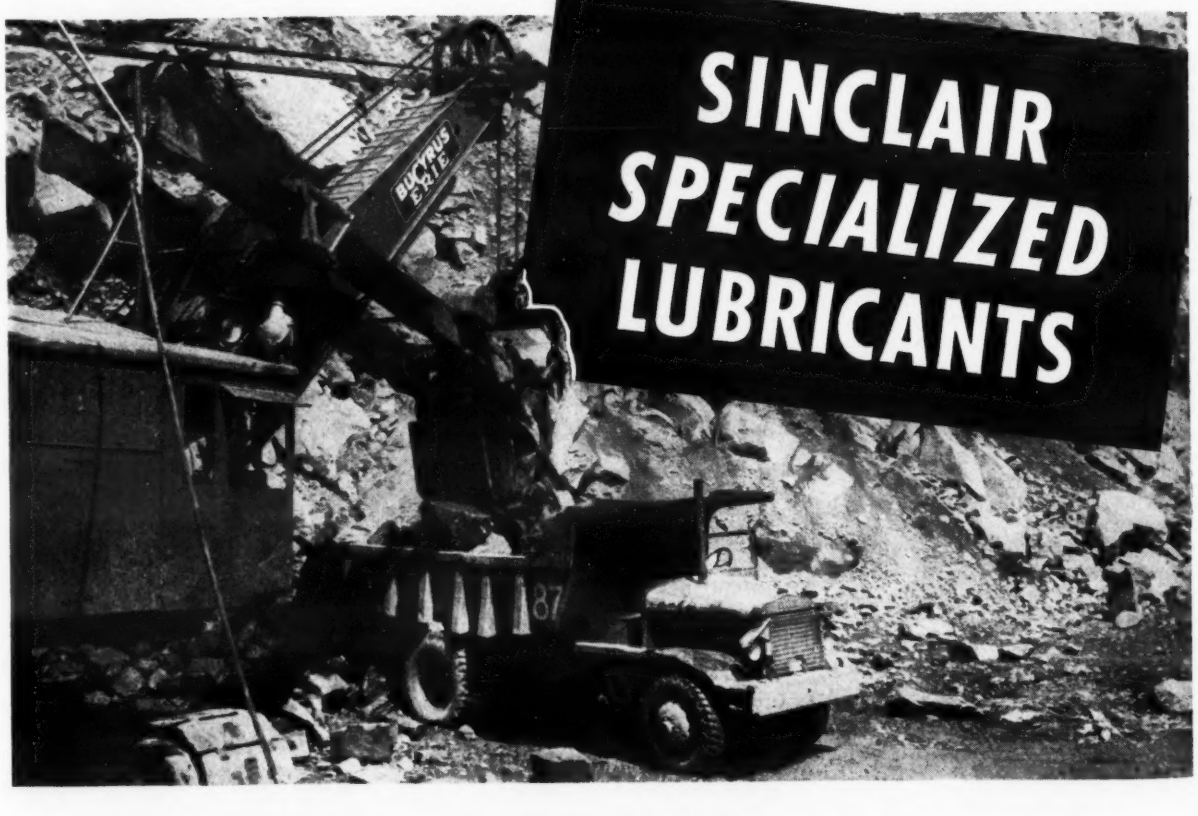
Junior CONCRETE RAPID PAVEMENT BREAKER

Fastest Pneumatic Method
Cuts Cost and Time
Works Inside or Out
Good for all Small Jobs



Ask about our HEAVY-DUTY TYPE
RAPID PAVEMENT BREAKER CO. 1817 Santa Fe Avenue Los Angeles 21, Calif.

Keep 'em on the Job...
with CORRECT LUBRICATION



A VITAL factor in keeping equipment available for continuous service is correct lubrication of *every part of the vehicle.* Failure of the smallest part—due to deficient lubrication—may put the entire machine in the shop . . . and shop time is non-revenue time.

Sinclair All-Point lubrication can be your guard against equipment lay-off. Sinclair lubricants are made for *specific* service at every individual point . . . to help keep machines moving.

Try . . . OPALINE MOTOR OIL for sure, safe engine lubrication . . . non-foaming OPALINE GEAR LUBRICANT with extreme pressure properties to prevent galling and scuffing . . . OPALINE CHASSIS LUBRICANT for stay-put protection in all weather . . . SINCOLUBE for assured, enduring wheel bearing lubrication.

Let these tested lubricants help keep your equipment available . . . regularly and economically . . . always.

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Rural County Handles Maintenance Problem

(Continued from preceding page)

road districts, each with its own organizational set-up. Overseers of the township and special road districts are appointed by the County Judges, and are responsible for the proper upkeep of the roads. They operate when directed by the Court, and are paid on a per-hour basis. Public pressure for necessary work is always present in this county, and it is actually a great help to the supervisors in determining where work is most urgently needed at a given time. In talking with these officials, however, you get the impression that John Q. Public is mighty close to the Linn Courthouse, and terribly persistent.

A. F. Rippstein of Chamois is the County Surveyor and ex-officio County Engineer. His is an elective office. It is Mr. Rippstein's job to lay out relocations, set grade stakes, design concrete culverts, and make periodic inspections of county engineering structures. He works in close cooperation with the County Judges and Road Overseers in determining what engineering standards will fit the county purse to the best advantage of its citizens. His post necessarily calls for well balanced judgement, a county-wide sense of proportion, and sound engineering.

Funds for the limited budget are derived from general revenue; that is to say, the taxpayers are assessed state, county, road, and school taxes, and the portion for roads is expended where it is best suited for Osage County. There is no return of a proportion of the state gasoline tax for the upkeep of county roads, as is the case in some other states.

Judge Delbert Matthews is the Presiding Judge of the County Court. Hardy Ridenhour is Judge of the 1st District, and James Kuper, Judge of the 2nd District.

Generator Line

Alternating current in various loads is supplied by a line of engine generators built by the Ready-Power Co. Supplied in four sizes, 15, 20, 30, and 50-kilowatt, the generators are powered by International engines in sizes varying with the output. Each generator is capable of producing a peak load considerably higher than its rating, it is stated. A similar line is built for dc use.

Two of the models, the 15 and 20-kw generators, are powered by diesel, gasoline, or natural-gas engines. The larger sizes are diesel-powered. The diesel units are equipped with 12-volt electric starting, and can be hand cranked. They start and warm up on gasoline, and are close-coupled to the generator with a direct-connected exciter. The gasoline models have 6-volt self-starting and magneto ignition. They possess replaceable cylinder sleeves and bearings and are hooked up to the generator through direct coupling.

In all models the generator, either a Century or a Westinghouse, has drip-proof construction with screening. It is piloted to the engine flywheel housing, has a single ball bearing, and a rotating field with damper windings. The generators are arranged for external voltage regulation, and include the following units in the enclosed ventilated control cabinet: automatic voltage regulator, voltmeter, ammeter, field rheostat, exciter field switch, and discharge resistor.

More complete details and specifications for these Ready-Power generators can be procured by addressing the manufacturer at 11231 Freud Ave., Detroit 14, Mich. Mention this report.

Welded Design Aids Truck Maintenance

Confronted with the problem of keeping a fleet of dump trucks in operation, an Eastern maintenance man turned to welding to overcome a troublesome difficulty. The pounding and shocks sustained by the trucks as the shovel was filling them resulted in frequent breakage of the malleable cast hinges on the tail-gates.

A dump truck with an injured tail-gate is as useful in quarry work as a Ming vase. And at the same time the reserve stocks of the malleable hinges were dwindling rapidly. What to do? Welding made the big difference. The maintenance man took 3 x 3 x ⅜-inch angle iron, cut it in 6-inch lengths, and welded his hinge brackets from it. Scrap iron was used for the work, and the metal burned off in shaping the bracket was used for gussets and hinge pin eyes. Labor and electrodes provided the only expense, and the work went on.

Report courtesy of Hobart Bros. Co., Troy, Ohio.

VULCAN TOOLS

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

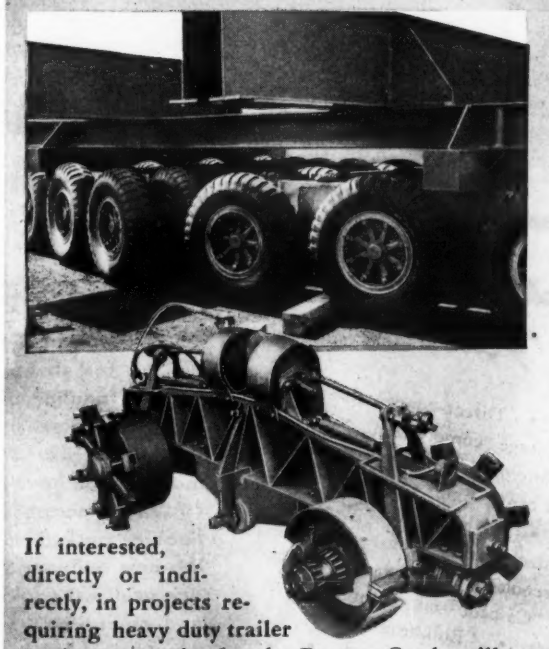
Vulcan Tool Manufacturing Co.

35-43 Liberty Street, Quincy, Mass.

Branch Offices and Warehouse Stocks:

74 Murray St. New York, N. Y. — 34 No. Clinton St. Chicago, Ill.

LOGICALLY... the world's greatest trailer was a ROGERS...



If interested, directly or indirectly, in projects requiring heavy duty trailer equipment, write for the Rogers Catalog illustrating and describing units exactly suited to all requirements.

THE necessity of moving a *300 ton burden, required in connection with a highly secret military test, presented unprecedented problems.

A railroad was out of the question. No vehicle of adequate capacity had ever been built. Failure was unthinkable and speed was imperative.

The search for specialized experience, engineering competency and plant facilities adequate to build a vehicle capable of handling this greatest of all moving projects led inevitably to the pioneer builders of heavy duty trailers.

Drawing upon a long career as manufacturers of commercial trailers and exceptional experience in building thousands of military tank trailers, this organization delivered in 30 days, a trailer 39 feet long and 17 feet wide.

Its sixty-four 14.00" x 24" military tires were mounted in banks of eight on axle units that permitted full oscillation to conform to uneven desert terrain and distribute the terrific load equally over all tires.

Significant was the fact that these axle units were duplicates of those that have long been used on ROGERS TRAILERS of larger capacity.

Yes, it is logical that the *world's largest trailer* should have been a ROGERS.

The above trailer (*which actually had a capacity of 600 tons on improved roads with conventional heavy duty tires), was built for Eichleay Engineering Corporation, contractors for the military authorities and sold by Atlas Equipment Company, both of Pittsburgh, Penna.

ROGERS BROTHERS CORPORATION
ALBION, PENNA.

EXPERIENCE builds 'em — ROGERS HEAVY DUTY Gooseneck Trailers — *PERFORMANCE sells 'em*

Urban Expressway To Start This Year

Contracts for Initial Section Being Readied for Letting on Houston, Texas, Project

✦ THE Texas Highway Commission has announced that, with the availability of the necessary right-of-way, the first section of the Urban Expressway through Houston, Texas, will get under way this year, with the awarding of contracts expected to take place in the immediate future. The initial 3.5-mile project on Interurban Boulevard lies south of the central business district and extends easterly to a point beyond Wayside Drive on U. S. 90.

A 210-foot right-of-way is required for this new express highway which will have four wide avenues of travel. On either side of a 4-foot median divider strip will be a 36-foot concrete pavement for three 12-foot lanes of traffic. Beyond these one-way travel ways will be 16-foot dividing areas, with 10 feet of this width surfaced for emergency parking. On the far side there will be 32-foot service roads. The concrete pavement will be 7 to 8 inches thick on a flexible 8 to 10-inch base.

Beneath the expressway an elaborate system of storm sewers will be constructed, and contracts for this work will be the first to be let. Following closely will be the awards for earth work and pavement base course. By midsummer 5,400 feet of reinforced-concrete and steel bridge structures are expected to be under contract, after which will come the concrete pavement, lighting, and traffic-control system.

The total cost is expected to be between $3,000,000 and $4,000,000 with a completion date scheduled for early in 1947. No exact location, design, or period of construction have been determined for the La Porte, Jensen Drive, and North Expressways which are the adjoining sections in the expressway system. W. J. Van London is Engineer-Manager of the Houston Urban Expressway project.

New Electric Plants Are Gasoline-Driven

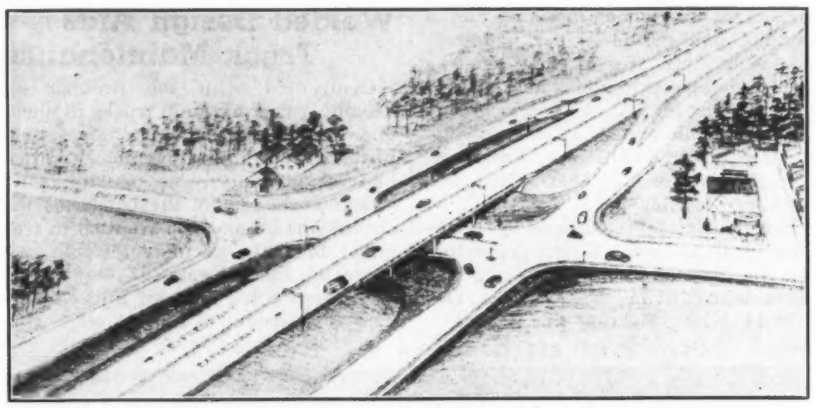
A wide range of gasoline-powered electric plants, designed to serve as light and power sources for contractors and others, is offered by the Winpower Mfg. Co., Newton, Iowa. The Winpower line runs through twenty-three different sizes of alternating-current plants, two dc power units, and four dc battery chargers. Alternating-current plants having special voltages, cycles, and phases are available on special order.

The twenty-three ac models are of the 115-volt 60-cycle single-phase 2-wire type. They generate wattages ranging from 300 to 35,000, and are driven by 1, 2, 4, or 6-cylinder engines capable of producing from 1 to 67 hp. Air-cooling systems are found in all plants of less than 2,000 watts, the larger models being water-cooled.

The two direct-current producers are capable of 600 and 1,500 watts respectively. Driven by 1-cylinder engines, these models are air-cooled. The plants used for battery charging have wattage outputs of 400, 600, 1,250, and 2,500. The 400-watt unit has a 12-volt generator, while the others generate 32 volts each. A water-cooled 7-hp 2-cylinder engine is found in the largest size, 2,500 watts.

All Winpower electric plants are available in de luxe housings, which serve to absorb much of the noise, keep out foreign matter, and aid in keeping the unit cool.

Readers of this magazine may obtain further information direct from the manufacturer on mention of this notice.



Work is scheduled to start this year on the Houston, Texas, Urban Expressway, one of the overpasses for which is shown in the above drawing.

Bushing Damps Vibration

Highway shopmen will be interested in a vibration-dampener bushing announced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc. For use with Manhattan portable-grinder wheels, the resilient mounting is described in Bulletin 6878 available from the firm. Ten advantages are claimed for the VDB feature.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can obtain copies of this bulletin from the Abrasive Wheel Department of the Manhattan Rubber Division, Passaic, N. J.

Galvin Assumes New Post In LaPlant-Choate Sales

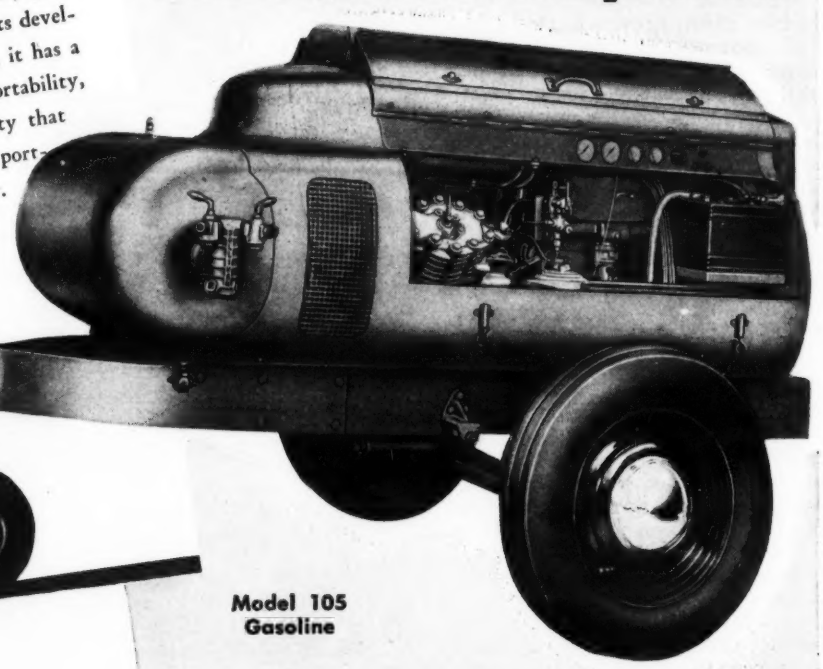
The appointment of E. R. Galvin to the post of Executive Vice President and General Sales Manager has been announced by the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa. Formerly President of the Tyson Bearing Corp., Mr. Galvin will also serve on LaPlant-Choate's Board of Directors. He is a Vice President of the American Road Builders' Association, and previously was General Sales Manager for R. G. LeTourneau, Inc., the Caterpillar Tractor Co., and the Cleveland Tractor Co.

S. L. Myers, who has been serving as LaPlant-Choate's Vice President and General Sales Manager, has now become Vice President and Export Sales Manager, while Jay M. Fetters, former Export Manager, has been named Manager of Foreign Development.

PACE SETTER for the portable air compressor industry

The new Sullivan Series 80 is the first portable air compressor to incorporate the NEW materials and efficiency-producing mechanical improvements developed during the war. Already, it has a reputation for efficiency, portability, low maintenance and reliability that marks it as the leader of the portable air compressor industry.

the New SULLIVAN Series 80 Portable Air Compressor



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SULLIVAN

THE WORLD'S MOST MODERN PORTABLE - COMPRESSED - AIR PLANT

Excavator's Versatility And Features Described

Designed to save machine and man-hours, the Hanson excavator is built in two sizes, ⅜-yard and ½-yard capacities respectively. The units can be used as clamshells, cranes, draglines, shovels, or trench-hoes as the occasion demands, little work being required to effect the change-over. The machine is air-controlled for easier steering, and all operations are handled by one man.

The upper turret mechanism of the Hanson is built for sturdy simplicity. It has two major horizontal shaft assemblies, the swing and the hoist and crowd shafts. All-welded alloy-steel bolsters and lower bed feature the long crawler base. The machine has cast alloy-steel tread shoes, rollers, sprockets, and idlers for a firm foundation.

These and other details of the Hanson's construction are shown in an illustrated brochure issued by the firm. Copies can be obtained on mention of this report by writing the Hanson Clutch & Machinery Co., Tiffin, Ohio.

Named by Ward LaFrance

Albert A. Frank, elected Vice President of the Great American Industries, Inc., heads a list of executive appointments in the firm's Ward LaFrance Truck Division, following the retirement of A. Ward LaFrance from active management of the Division. Mr. Frank will serve as General Manager of the Truck Division, having previously been the General Sales Manager of that Division.

Other newly named Ward LaFrance executives include E. M. Hoefle, who will succeed Mr. Frank as General Sales Manager; C. W. Wiley, Domestic Sales Manager; R. L. Harmon, Export Sales Manager; N. G. Bjorck, Chief Engineer; R. L. Moody, Factory Manager; and R. M. Bingham, Production Superintendent.

Dealer in Texas

Texas users of Koehring, Kwik-Mix, Parsons, and C. S. Johnson products are now being served by the F. S. Ray Co., 7515 So. Main St., Houston, Texas. F. S. Ray, associated with his son, F. Wayne Ray, has been selling construction equipment for over 20 years, having been representative for the Hug Co. and the Koehring Co. The Ray territory in southeast Texas includes Bell, Milam, Burleson, Brazos, Madison, Walker, Trinity, Polk, Tyler, Jasper, Newton, Lee, Washington, Austin, Colorado, Wharton, and Matagorda Counties.

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The Sanivan carries on *one trip* what is ordinarily three truck loads. You fill the hopper, the positive compressor crushes the refuse, cubic yard by cubic yard. The hopper is 34 inches from the ground for safe, rapid filling. Transfer of garbage to the truck interior is fully mechanical. The Sanivan handles mixed garbage, ashes, cartons, leaves and other usual refuse.

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3 LOADS IN 1

Construction Industry, Its Pattern for Future

"America progresses through construction. There is scarcely any phase of civilized life, improvement in our standards of living, or any progress in the nation which does not require some form of construction. In peace, as in war, construction is basic to the American economy." This was the message of H. A. Dick, President of the Associated General Contractors, to the recent Associated Equipment Distributors' 27th annual convention in Chicago.

"In order that the construction industry may do its share in producing, and in providing employment in greater measure than ever before," continued Mr. Dick, "I believe the following are necessary:

"The industry must exert its efforts to help bring about a constant improvement in our standards of living through the system we call 'private enterprise'. The prosperity of this industry and the nation depends on such improvement. And development of the nation to the fullest extent of its resources can come about best through free enterprise.

"We must work closely with governmental agencies, both national and local, so that laws and policies are adopted which are fair to all people, and allow the industry to operate most efficiently and economically. We must cooperate with labor in our industry, for we will not secure maximum production or employment if there is bickering between management and labor.

"We must continue our efforts to secure the planning and development of construction projects which will serve most effectively the needs of our clients and the public. We must strive constantly to improve our operations so that the public continuously secures greater value for its investment in construction and is encouraged to make such investments.

"Finally we must continue to give more attention to conducting our operations so that we merit and secure the good will of the public. Ultimately, the volume of work which this industry will be permitted to perform in the future will depend to a large extent upon the confidence which others have in us."

I-H Personnel Changes

Changes in branch managerships for its Motor Truck and Industrial Power Divisions have been announced by the International Harvester Co., Chicago, Ill., with the establishment of separate branches at San Antonio and Houston, Texas, to handle motor-truck sales, parts, and service exclusively. Two former Assistant Managers in charge of motor trucks will head the new offices: T. R. Moulder at San Antonio, and C. T. Helin at Houston. The latter will be assisted by E. M. Moore, former Retail Motor Truck Manager.

M. J. Gowan, Assistant Manager at Cincinnati, has been made Manager of the Richmond, Va., truck branch, and L. C. Carroll, formerly at Columbus, Ohio, goes to Cincinnati as assistant. C. V. Ellis, an Assistant Manager, has been transferred from Topeka to Kansas City.

George Schantz has been named Manager for the Industrial Power Division's Zone 5, centered at Albany, N.Y. Recently discharged as an Army Captain, he will work in cooperation with the Vermont Road Equipment Co., Montpelier, and the Milton Hale Machinery Co., Albany and Syracuse, outlets for International power equipment.

AIR PLUS JAEGER COMPRESSOR

FAR AHEAD OF THE FIELD

Engineered for the latest type Continental, Caterpillar and International engines, Jaeger "AIR PLUS" matches modern power with compressors of equally advanced design and precision manufacture, employing giant "ultra-lapped" valves and 20% to 30% slower operating speeds than others to deliver air more efficiently and at cooler temperatures.

Contractors now using "AIR PLUS" Compressors on thousands of jobs will tell you that their smoother performance and abundant air supply, obtained with less demand on engine and compressor and proportionate savings in both fuel and upkeep, have made pre-war engineered compressors completely out-of-date.

Sizes 60 to 500 ft. Sold and serviced in 120 cities. Ask for Catalog JC-5

Why Buy an Obsolete Compressor When You Can Get a JAEGER?

- Air-cooled, 2-stage, vertical compressor—built in a balanced "W", full force-feed lubricated — 3 point suspension — interchangeable precision parts.
- 100% efficient intercooling, automatic drainage.
- Massive main frame with recessed fuel tank, 30% to 50% larger air receivers, bigger tool boxes, lifetime clutches, sectional radiators and intercoolers, electric starter, grouped controls, Timken bearing wheels, "Auto-Steer" axle, etc. all standard.

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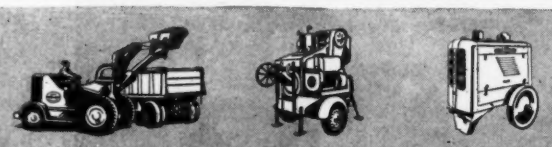

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INSUFFICIENT manganese often causes brittleness in manganese weld deposits. If rods are drawn in manufacture, manganese must be limited because of work-hardening. A slight excess of manganese makes drawing impossible. Drawn rods are therefore necessarily limited to a barely sufficient supply of manganese, with risk of weld deposits falling below the 11% minimum.

Coated Stoody Manganese electrodes overcome skimpy manganese content. Since the electrodes are made by tightly rolling the alloying elements in mild steel tubes, a greater percentage of manganese can be included, allowing for burn-out loss with a high margin of safety. Thus, you're assured of more than the minimum alloy content to obtain desirable toughness and wear resistance.

Here Are Other Coated Stoody Manganese Qualities

Fast burn-off rate, low spatter loss, low penetration, high build-up, unusual arc stability with either AC or DC application, easy slag removal.

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Canal-Bank Slopes Stabilized, Seeded

(*Continued from page 1*)

done by pick and shovel, and the hauling by mules and carts. The section known as the "Deep Cut" involved the greatest difficulties, the excavation depth being as great as 75 feet. The excavated material was deposited on the banks adjacent to the work, but this added weight caused the banks to slide in, requiring the removal of considerable excess earth.

In 1919, the Federal government purchased this privately built and operated toll canal, and had the Corps of Engineers reconstruct it from a lock to a sea-level canal. After this was done, the big ditch was then enlarged to ship-canal proportions. The canal is now 14 miles long, with a new eastern entrance at Reedy Point, Del., has a bottom width of 250 feet, and a depth of 27 feet, with the width at the surface varying according to the depth of excavation. Both ends of the canal pass through fairly flat land whose elevation is just above sea level, but near Summit Bridge, Del., the general elevation of the land is around 80 to 85, requiring considerable excess excavation because of bank slides.

Continuing slides in this area, endangering the open channel, resulted in a decision to find a method of stabilizing the banks. Studies indicated the need of a flatter slope than 1 on 2, with relieving berms, and some system of drainage to carry off the ground-water flow. A program of bank stabilization was approved in 1939 and work was started shortly thereafter, but the war retarded progress with these plans. Hendrickson Brothers began work on its contract in the closing days of 1944 and finished by the end of October, 1945. There still remain some sections of bank stabilization to be contracted for.

New Section

The Hendrickson contract called for the stabilization of 2,000 feet of bank on the north side of the canal, running east from Summit Bridge which carries Delaware State Route 71 over the canal 75 feet above low water. Stabilization was achieved by cutting back into the old 1 on 2 slopes, flattening them out slightly to 1 on 2½, and breaking them up with two, and in some sections three, berms running the length of the improvement. The lowest of these berms is 25 feet wide, and is used for a roadway along the canal since its elevation is between 10 and 12. From this berm the slope ascends 1 on 2½ to elevation 35 where a 20-foot berm was cut into the bank. Above this step the 1 on 2½ slope continues upward to elevation 60 where, for the greater length of the contract, a wide natural berm was graded to improve drainage conditions. For the western 500 feet of the contract, however, a third berm, 20 feet wide, had to be made as the bank continued up to elevation 104 before the summit was reached.

Nearly 400,000 cubic yards of excavation was required to grade the 2,000 linear feet of bank, with work starting at the top of the badly eroded slopes as the material was moved up and back from the canal. Above elevation 30 the soil was a sandy loam, while below that level the material was a heavy, wet, dark-colored sandy silt. To excavate and move this earth the contractor used one 12-yard and two 14-yard LeTourneau scrapers pulled by Caterpillar D8 tractors for hauls up to 1,000 feet. For longer hauls up to 1,500 feet, five 12-yard Super C Tournapulls were employed. Working along with the earth-moving equipment were five other Caterpillar tractors with dozers, three D8's, a D7, and a D6, to act as pushers in loading, and to grade the slopes. As the berms or terraces gradually took shape, they were connected by wide ramps on gentle slopes for the equipment to roll on. These and other haul roads were kept in shape by an Austin-Western power grader which also did the fine grading on the berms and disposal area.

C. & E. M. Photo

This view along the bank of the Chesapeake & Delaware Canal shows the manner of flattening the slopes with berms at intervals to aid in slide prevention.

At the eastern end of the job a deep gulley leading back from the canal had also been the scene of considerable erosion. This area provided a good outlet for disposing of some of the surplus excavation as 100,000 yards was required to fill it. A compacted fill 50 feet high containing 28,000 cubic yards was made to close the outlet to this gulley. The material was spread in 6-inch layers and compacted by a dual-drum sheepsfoot roller pulled by a D8 tractor. The remainder of the excess earth was deposited in an old disposal area adjacent to the cut and graded to drain to the

(*Continued on next page*)

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**For normal service where D.H.D. is not required, use Naturalube Motor Oil (not so heavily reinforced.)*

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LION PETROLEUM PRODUCTS

LION OIL COMPANY EL DORADO, ARKANSAS

Canal-Bank Slopes Stabilized, Seeded

(*Continued from preceding page*)

north and east on slight 1 per cent grades.

Bank Drainage

Steps were also taken to see that these terraces and slopes were adequately drained and that no danger would arise from erosion. So impregnated with water are the slopes adjoining this contract on the west that several wells, 6 feet in diameter and 40 to 50 feet deep, had to be dug into the ground at the top of the bank in order to drain the many springs which had their source deep in the earth and constituted a potential menace in the way of slides. While wells were not considered necessary on this contract, a complete system of pipes was laid to provide ample drainage.

Longitudinal subdrains were constructed in the slopes to intercept and carry off ground water, and were connected to laterals running down the slopes to carry away the surface runoff. The subdrains comprise trenches 2 feet wide and averaging 4 feet deep, which were dug by a Northwest crane with a 50-foot boom and a ½-yard bucket. At the bottom of the trench was placed a line of 4-inch perforated vitrified-clay pipe with sealed joints on a 4-inch layer of filter material. The trench over the pipe was filled with the same material to within 9 inches of the surface and then sealed with compacted selected material. The filter material was a 50-50 mixture of graded sand and gravel. Three or four subdrains at vertical intervals of 8 to 9 feet were required to control the ground-water flow. The lateral drains are 12 to 36-inch concrete pipes leading from inlets on the berms down the slopes underground and overboard through the revetment.

Stone Revetment

The face of the slope below the roadway has been protected against erosion and wave wash from the canal with stone riprap, 1½ feet deep, resting on a 6-inch bed of gravel extending for the full 2,000-foot length of the contract. The preceding work was done with a minimum of labor and the full use of construction equipment, but the revetment building could be done only by hand, and labor was exceedingly scarce in this area throughout 1945. This shortage was overcome when the contractor obtained the services of ten German prisoners of war from Fort Du-Pont, Del., to unload the stone and set it in place. Working with the prisoners were four hired colored finishers who looked after the final top dressing of the stone revetment.

C. & E. M. Photo

Stone for the revetment along the C. & D. Canal was unloaded by German prisoners of war to steel plates, used to prevent the heavy stone from penetrating the gravel foundation layer. The plates were later removed by cable and tractor.

As the stone was to start at elevation 0 and go up the bank to elevation 11, a dragline bucket was placed on the Northwest crane, which then worked along the lower berm cleaning off the toe of the slope and casting the material out in front to build a dike at about elevation 7, behind which the construction could proceed free from water coming in from the canal. Sections about 100 feet long were worked on at a time, and any water that seeped through the dike in front or its side wings was removed by Gorman-Rupp 2 and 4-inch pumps.

Gravel for the 6-inch foundation layer was purchased from the Arundel Corp. at Elkton, Md., and hauled from there in 5-ton loads by a Ford truck a

(*Continued on next page*)

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Overload protection is *built into* Vickers Power Hydraulic Controls for construction equipment. A relief valve stands guard on each circuit, so when overload occurs, the valve opens—returns oil to the tank—relieving the strain.

Nothing is injured. When the overload is cleared, the relief valve automatically closes, and the circuit is ready to go back to work.

Overload cannot damage equipment having Vickers Power Hydraulic Control—it cannot even cause any inconvenience—the relief valve takes care of it.

The effect of this automatic protection on the life of the equipment is obvious. But there is another advantage—the operator doesn't have to "baby" the machine. He knows there is overload protection—hence he can work as fast and crowd as hard as he likes—an important feature when the "going is tough."

For easier and more accurate control—faster work—specify Vickers Power Hydraulic Controls.

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ENGINEERS AND BUILDERS OF HYDRAULIC EQUIPMENT SINCE 1921

Canal-Bank Slopes Stabilized, Seeded

(Continued from preceding page)

distance of 10 miles to the canal. The truck end-dumped the gravel down the slope where it was spread by hand. To prevent the heavier stone from piercing through the gravel layer during the unloading operations, the contractor obtained four steel plates, 24 feet long x 6 feet wide x ¼ inch thick, and placed them over the gravel, with the long dimension perpendicular to the berm. After the heavy stone had been unloaded on top of the steel plates, the latter were removed by passing a cable through two holes at the top of each plate and having a D6 tractor pull them out from under the stones which were then ready to be set in place by hand.

The revetment stone was purchased from the Port Deposit Co. at Port Deposit, Md., and hauled, generally on flat-bed trucks, 30 miles to the road along the lower berm. Here the PW's unloaded the stone by hand, throwing the pieces down the slope on top of the plates. Half of the stone pieces weighed from 100 to 200 pounds, while one-quarter weighed from 50 to 100 pounds, and the remaining quarter ranged from 200 to 300 pounds. The heavier pieces were placed at the toe of the slope, and all stone was laid with the longest dimension perpendicular to the slope, stacked up like a dry wall. About 100 tons of stone were laid in a 10-hour day by this group of former enemy soldiers who regarded the progress of the work with interest.

Quantities and Personnel

With the new terracing and flattening of the slopes, no trouble is expected from slides along this deep section of the canal which is now well drained and fortified against wave action and erosion at the base by the stone revetment. The major items in this $200,000 contract included:

Excavation	390,000 cu. yds.
Earth fill, compacted	28,000 cu. yds.
Sand and gravel filter material (trenches)	2,400 cu. yds.
Vitrified-clay perforated drains, 4-inch	7,000 lin. ft.
Concrete pipe, 12 to 36-inch	1,230 lin. ft.
Gravel bed for revetment	6,000 sq. yds.
Stone revetment	5,000 tons

A. I. Hendrickson and Jerry Sposato were Superintendents for Hendrickson Bros. of Valley Stream, N. Y., and Maynard Ritter was Resident Engineer for the U. S. Engineers on this bank-stabilization contract.

Slope Preparation

After the slopes were graded and dressed, they were seeded as part of a maintenance project by the U. S. Engineers. Again, German PW's, twenty others also from Fort DuPont, were used on this work with good results. The first step was the spreading of a 4-inch layer of topsoil over the 11½ acres of 1 on 2½ slopes. The topsoil

C. & E. M. Photo

On the U. S. E. D. maintenance project of seeding the slopes, German PW's were used in spreading the 4-inch layer of topsoil.

was obtained from a Government-owned field, 4 miles away, where it was excavated to a 1-foot depth by an Osgood dragline with a 45-foot boom and a 1-yard bucket, and hauled to the slopes in assorted trucks carrying 2 yards to the load. Here it was end-dumped down the slopes and spread roughly by a Caterpillar D7 tractor-dozer which pushed the material up and down the slopes with its 12-foot blade. The PW's, with potato hooks, rakes, and shovels, fine-graded the soil, breaking up any crust or large lumps of the material, and giving the slopes a well manicured appearance.

The ground was then enriched first with 3,300 pounds to the acre of ground magnesium limestone which was cast by hand from pails and raked into the soil in a movement parallel to the bottom of the slope. This was followed with 2,200 pounds to the acre of commercial fertilizer, composed of 3 parts nitrogen, 12 of phosphorus, and 6 of potash. A 4-12-4 mix was preferred but could not be obtained. The fertilizer was applied in the same manner as was the limestone. The fertilizing, seeding, and mulching were done by the regular 20-man labor gang of the U. S. Engineer maintenance forces.

A mixture of eleven different kinds of grass seed was then sown over the slopes at the rate of 110 pounds to the acre by a man walking lengthwise of the slopes with a hand seeder, which threw the seed out in a 15-foot-diameter circle as he moved along. Two passes were required over the same course to distribute the right amount of seed. The mixture was composed of the following

(Concluded on next page)

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UNIT CRANE & SHOVEL CORP.
MILWAUKEE 14, WISCONSIN, U. S. A.

Canal-Bank Slopes Stabilized, Seeded

(Continued from preceding page)

grasses:

Kind	Per Cent
Kentucky bluegrass	4
Canada bluegrass	4
Orchard grass	8
Chewing fescue	4
Timothy	8
Redtop	5
Domestic ryegrass	25
Tall oatgrass	10
Alsike clover	12
Black medic	10
Lespedeza	10
Total	100

In order to give the seed a chance to germinate and the moisture to be retained in the soil, a thin layer of mulch, about ¾ to 1 ton to the acre, was then spread over the slopes and cut in lightly with hand shovels to make it stick so it would not blow away. The mulch was hay that had been cut from Government-owned fields.

William T. Thompson of the U. S. E. D. was Inspector on this work.

Facts and Personnel

The Chesapeake & Delaware Canal, located in the northern corner of Maryland and Delaware, cuts 290 miles from the water travel distance between Philadelphia and Baltimore, as the sea voyage between those two ports requires a journey of 384 miles while it is only 94 miles over the inland waterway. By using the canal, the distance from New York to Baltimore is 265 miles, a saving of 153 miles over the longer 418-mile distance traversed in the outside passage around Cape Charles at the lower end of Chesapeake Bay. The importance of this ship canal soared to great heights during the war when 10,000,000 cargo-tons a year passed through the body of water as compared with 2,500,000 tons prior to the war. Vessels of 25-foot draft and under may transit the canal which is open to navigation 24 hours daily.

H. H. Howard, with headquarters at Chesapeake City, Md., is Superintendent of the C. & D. Canal, assisted by B. H. Brown who is in charge of the Operations Section. Col. F. F. Frech is District Engineer for the U. S. Engineers, with headquarters at Philadelphia.

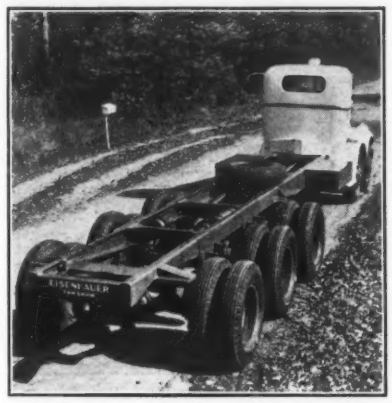
Twin-Engine Truck Has 20-Ton Capacity

A new type of truck, designed specially for fast long-distance hauling, has been developed by the truck division of the Eisenhauer Mfg. Co., Van Wert, Ohio. The vehicle has a payload capacity of about 20 tons and is featured by two engines and four front steering wheels.

Known as the Eisenhauer Twin Engine truck, the vehicle is equipped with sixteen Goodyear Hi Miler heavy-duty tires and a special arrangement of wheels to make possible greater load capacity through better distribution. It has three rear axles, two of them driving or "live" ones, with a "dead" axle between. The live axles achieve greater traction because of their remote spacing, it is claimed. The need for power steering is eliminated by building the four front wheels in tandem rather than in dual relation.

Two 93-hp engines, one under the hood and the other under the cab, provide the power, and can be used together or independently. Power selection is accomplished at will by means of a differential-type synchronizer. A torque equalizer actuated by manifold pressures balances the torque output of the two engines.

The truck is 35 feet long, and has a bed of 25 feet. Its frame is rigid, but suspended flexibly so as to remain level



The new Eisenhauer truck has three rear axles, including two driving or "live" axles and a "dead" axle between, with dual wheels on all three axles, and singles on the two front axles.

and not rack. All rear axles have dual wheels. Special spring suspension provides flexibility and insures proper wheel contact at all times. With the exception of the frame and suspension, standard 1½-ton truck parts are used throughout.

Details may be secured, on mention of this item, direct from the company.

Governor Manufacturer In Diamond Jubilee Year

Founded in 1870 when Amos Woodward patented the first friction-type waterwheel governor, the Woodward Governor Co. is now in its diamond jubilee year. Located at Rockford, Ill., the firm manufactures hydraulic governors and auxiliaries for waterwheels, water turbines, diesel engines, steam turbines, airplane propellers, and other prime movers.

To mark its jubilee, Woodward has published an illustrated book depicting the firm's history, the development of its products, and its war record. The engineering, research, machine-shop, and service facilities of the organization are shown. Portraits of members of the management and veteran workers complete the volume.

Steel-Fabrication Firm Describes Its Services

Steel fabrication for a wide variety of purposes in the construction field is the work of the Olson Mfg. Co., Boise, Idaho, which has issued a 24-page illustrated brochure to tell of its activities. Among the services the organization has rendered western contractors has been the design and fabrication of steel tunnel jumbos, special tanks and truck bodies, and other steel items; the erection of the structures for conveyor systems; and supplying pipe lines for many of the west's irrigation projects. In addition to its steel-fabrication activities, the Olson company maintains a distribution outlet in Boise for many lines of construction equipment.

Other subjects covered in the booklet, "The Story of Olson City," include a history of the firm and its war record. Copies can be obtained by writing direct to the company. Just mention this notice.

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON EVERY SUNDAY NIGHT — CBS

TEXACO

REG. T. M.

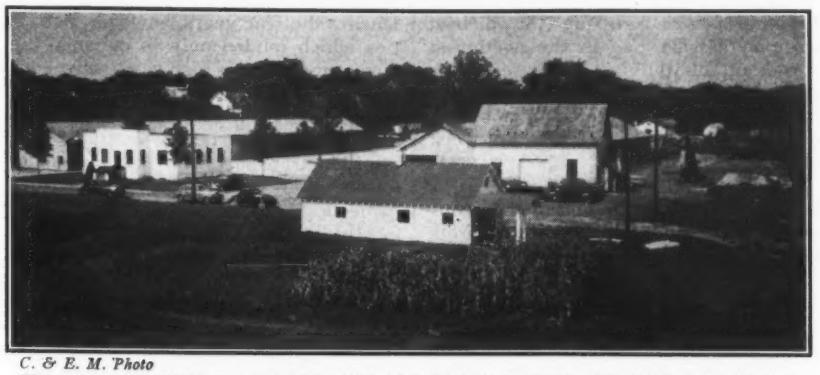
TEXACO

Portable Two-Unit Rock-Gravel Plant

A new development of interest to operators of portable rock and gravel plants has been announced by the Pioneer Engineering Works. It is a two-unit plant of high capacity which is completely portable, flexible, has low headroom, and is light enough to meet state highway load limits.

When used for rock, the primary unit of the new plant includes an apron feeder, a primary jaw crusher, and a power unit, all mounted on a 3-axle truck. For gravel work, a feeder conveyor, scalping screen, primary jaw crusher, and power unit are used, similarly mounted. Three sizes of primary jaw crushers are available: 10 x 36, 15 x 36, or 20 x 36 inches.

The secondary unit, also self-contained on a 3-axle truck, is similar for either type of plant. It includes a feeder conveyor, a 4 x 10-foot vibrating screen, a 40 x 22-inch roll crusher, a return conveyor, and a power unit.



C. & E. M. Photo

The group of buildings comprising the Maryland State Roads Commission District 3 shops is located in Laurel, convenient to both railroad and state highway.

A change-over from rock work to gravel, or vice versa, is said to necessitate but little effort. Further flexibility can be provided in the gravel primary unit by the addition of a swivel conveyor, with the feeder and hopper moved to its receiving end.

Full details, including sketches and drawings of this new Pioneer plant, can be secured on mention of this news item direct from the Pioneer Engineering Works, 1515 Central Ave., Minneapolis 13, Minn.

Cancer killed 607,000 Americans between Pearl Harbor and V-J Day. Help fight this dread disease by supporting the American Cancer Society.

District Shop Is In Good Location

Four Counties With 913 Miles of Roads Serviced From Headquarters Near U. S. 1 and Railroad

✦ THE site of the highway shop for District 3 of the Maryland State Roads Commission was well chosen on the eastern outskirts of Laurel, a town lying about halfway between Baltimore and Washington on U. S. 1. At the southern end of the 6-acre plot of ground is the main line of the Baltimore & Ohio Railroad over which equipment, supplies, and material can be shipped directly to district headquarters via a spur track entering the yard. At the western end of the grounds is State Route 216, an access road which has been reconstructed recently to Fort George G. Meade, 5 miles to the east. A new overpass carries the highway over the railroad at this point.

District 3, which also has its engineering headquarters located here, includes the four counties of Anne Arundel, Howard, Montgomery, and Carroll, all lying west of Chesapeake Bay. Each county has a small maintenance garage for minor repairs, while the more important work is brought to this district shop which lies close to the border between Howard and Anne Arundel Counties. The shop lacks facilities for repairs of a major character, so such work is either sent out to commercial garages or done in the main shop of the Roads Commission in Baltimore.

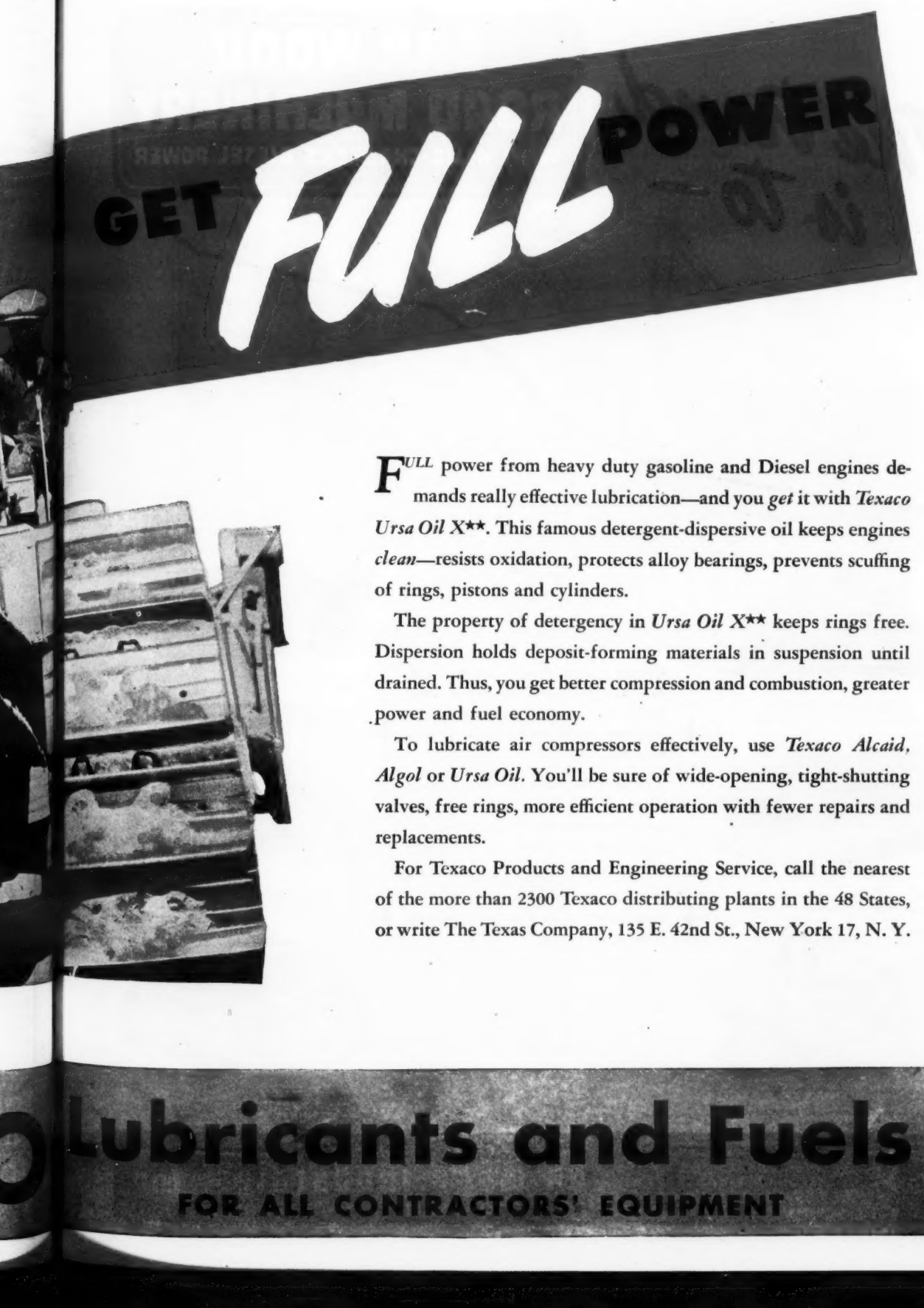
Three of the six buildings comprising this layout were erected in 1939, while the others are of varying age. Near the macadam drive entrance, surrounded by a lawn, is the single-story 45 x 35-foot concrete building housing the headquarters of the district engineer. Northeast of this office is a long structure known as the truck garage, 30 x 300 feet, made of concrete blocks with steel trusses supporting a corrugated-metal roof. The building is made up of twenty 15-foot bays, each of which has a 12-foot-wide overhead sliding door at the south end, and a large window at the north end or rear of the building. Artificial illumination is obtained from a single overhead electric light suspended from each truss. Besides its function as a truck garage, the building is used for storing such miscellaneous items as calcium chloride, brooms, and snow plows. The floor is unpaved at present.

Twelve of the bays available for storage are used for housing the equipment which operates in the northern portion of Prince George County under the jurisdiction of District 5. Also, half of the repair-shop facilities is made available to this District.

Repair Shop

At the eastern end of the yard is the repair shop which, with the other two buildings just mentioned, was the more recent addition to the layout. This building is also constructed of concrete blocks, steel trusses, and corrugated-metal roof, and measures 40 x 105 feet. The long dimension is made up of seven 15-foot bays with a 12-foot overhead sliding door at the front or north end, and a large window with translucent glass at the rear of each bay. The four bays at the west end of the building have a dirt floor and are used for storage. The easterly 45-foot section of building with its three doors has a concrete floor, and opens out on a 45-foot-square concrete ramp on which equipment is left before and after being in the shop. Two electric lights hang from

(*Concluded on next page*)



FULL power from heavy duty gasoline and Diesel engines demands really effective lubrication—and you *get* it with *Texaco Ursa Oil X***. This famous detergent-dispersive oil keeps engines *clean*—resists oxidation, protects alloy bearings, prevents scuffing of rings, pistons and cylinders.

The property of detergency in *Ursa Oil X*** keeps rings free. Dispersion holds deposit-forming materials in suspension until drained. Thus, you get better compression and combustion, greater power and fuel economy.

To lubricate air compressors effectively, use *Texaco Alcaid, Algol* or *Ursa Oil*. You'll be sure of wide-opening, tight-shutting valves, free rings, more efficient operation with fewer repairs and replacements.

For Texaco Products and Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, 135 E. 42nd St., New York 17, N. Y.

Md. District Shop Is In a Good Location

(*Continued from preceding page*)

each truss in this shop wing.

Along the rear wall is a 40-inch-wide metal-topped work bench with six drawers beneath for keeping tools and parts. This bench is equipped with one 5-inch and two 4½-inch bench vises and a Black & Decker 8-inch ball-bearing bench grinder. Work is also done in the middle of the room on a couple of metal tables, 3½ x 2 feet, made by welding plates and angles together, and easily moved about on rollers. One of these tables has a 4½-inch bench vise fastened to it.

Equipment is jacked up with a Walker 10-ton roller floor jack, and other heavy lifting is done by a Roeper 5-ton hoist which rolls along overhead on a steel beam. Two outlets are provided at the long work bench for compressed air which is obtained from a Quincy compressor. Other equipment includes a Dualarc portable electric welder mounted on a carriage with four rubber-tired wheels, and also the usual oxy-acetylene welding unit. On a stand at one side of the room is a Black & Decker 10-inch ball-bearing bench grinder.

Along the west wall are two steel clothes lockers and a wash sink, with hot water supplied by a kerosene water heater. A coal-burning boiler in one of the other buildings provides heat, with the circulation helped by a blower mounted on a side wall. Equipment is greased by an Alemite pressure system, and the building is protected against fire by Foamex extinguishers.

Other Buildings

Just west of the shop is a 70 x 33-foot concrete-block building with a concrete floor which is used chiefly for the storage of oil drums and tires. It is entered from either end through a 12-foot overhead door. Off the southwest corner of this building is a 15 x 15-foot concrete-block lean-to which houses the coal-burning furnace and boiler supplying heat to the shop. Adjoining this building is a 40-foot-square brick building, painted gray, which is also used for a storeroom, mostly for equipment parts which are kept in wooden bins. A gasoline pump for refueling the district equipment is located in the northwest corner of this building. One section is used as a small office for the maintenance workers to make out forms connected with their duties and other work of a clerical nature.

The last building, the paint shop, is located at the western end of the property, and is also constructed of concrete blocks. It measures 40 x 20 feet with a 12 x 8-foot covered platform at the south end where the road signs to be repainted are unloaded. A Yale ½-ton hoist is rigged up on this platform to facilitate the handling of the signs which are then painted on the inside by the stenciling process.

Personnel

About 40 employees are now working out of this district shop, engaged in the various maintenance activities covering the highways of the four counties. Included in this number are chauffeurs, mechanics, laborers, etc., who before the war totaled between 90 and 100. During the war years, however, activities which tended only to enhance the appearance of the highways were curtailed, so that the structural stability of the highway system was maintained, and highly important war traffic was afforded transport with a minimum of hazard and delay. The maintenance projects that were carried on were mostly either shoulder stabilization with the use of calcium chloride to prevent excessive erosion and maintenance, or the installation of storm drains at various places to eliminate flooding.

The mileage of roads maintained in District 3 by counties is as follows:

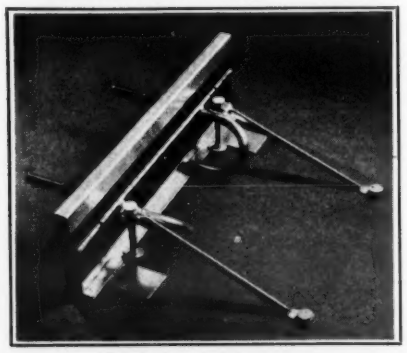
Anne Arundel	248.35
Howard	146.09
Carroll	197.45
Montgomery	321.32
Total	913.21

These roads carry considerable traffic, as the district is bounded on the north and south by the busy metropolitan centers of Baltimore and Washington, two densely populated areas. From October, 1942, to June, 1944, 228 miles of this road system were surface-treated, and during the 1944 season 141 additional miles were given applications of oil, using 460,776 gallons. Lack of sufficient labor prevented more of this type of work being done, although money had already been appropriated. For the fiscal year ending June 30, 1944, for instance, an amount of $117,366 remained unexpended from an appropriation of $543,870 for regular road maintenance. An inspection of the roads in District 3 indicated that the unexpended funds could have been used, and were required for the high order of maintenance which had existed in pre-war years, but the labor shortage prevented the undertaking of such work.

W. F. McCormick is Superintendent of Equipment of District 3 with headquarters at Laurel, Md., and E. G. Duncan is District Engineer. The Maryland State Roads Commission, with offices at Baltimore, is headed by Robert M. Reindollar, Chairman, and Wilson T. Ballard, Chief Engineer. Frank P. Scrivener is Maintenance Engineer.

Well Anchored Joints For Concrete Paving

Tested and Proved for the past 10 years



DOW-WELD

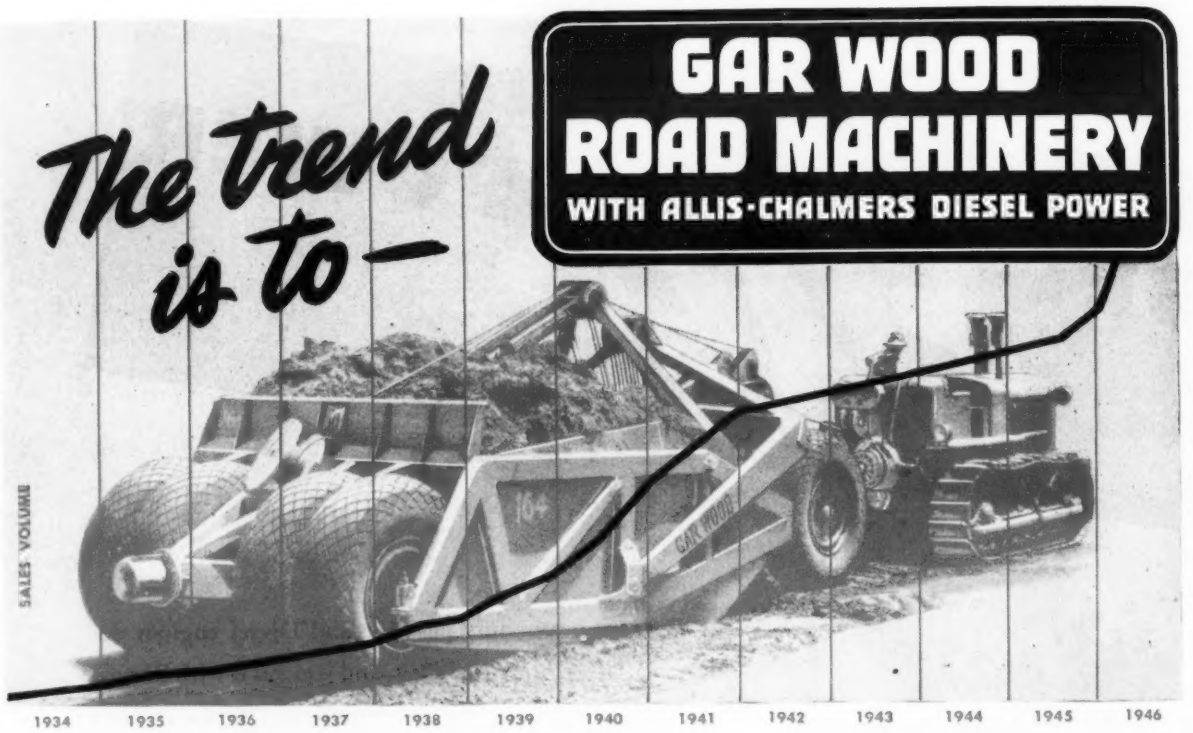
Assembled Expansion Joints

The DOW-WELD joint is delivered in the form of a rigid welded truss unit and is permanently anchored to the subgrade, thus insuring a true alignment of the dowels. Due to the staking device it is not necessary to disturb the concrete.

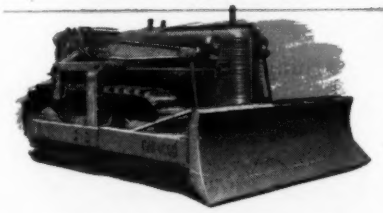
This joint has been extensively used for the past ten years on major highway and airport projects, and the results have been tested and proven to be satisfactory.

We shall be glad to furnish the location of such projects upon request.

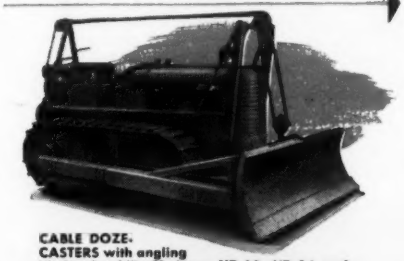
DOW-WELD CO., Inc.
21st St. West of Howard, Baltimore 11, Md.



4-WHEEL CABLE SCRAPERS
Capacities: 11-15-20-25 cu. yds.



HYDRAULIC DOZECASTERS with angling blades, for all Allis-Chalmers Tractors



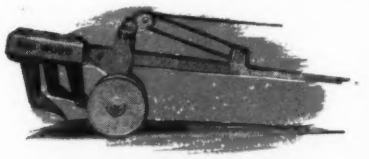
CABLE DOZE-CASTERS with angling blades, for Allis-Chalmers HD-10, HD-14 and HD-14C Tractors

On every kind of earth moving job, throughout the world, Gar Wood Road Machinery has made good, setting new high standards of performance and workmanship.

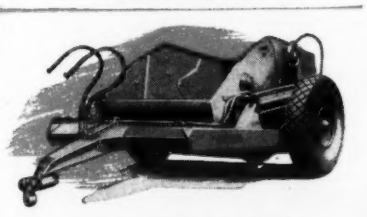
As a result, the demand for this equipment has steadily grown over a period of many years (see chart above) until now it has reached the proportions of a world-wide trend.

Here is a sound reason for specifying Gar Wood earth moving units. "Nothing succeeds like success."

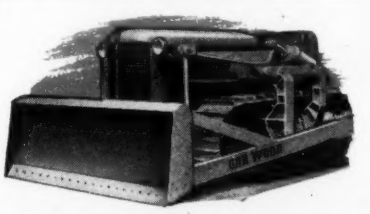
Contact your Allis-Chalmers dealer. Let him point out the superior features of Gar Wood Road Machinery and show you actual job performance in your territory with many satisfied users.



HEAVY DUTY RIPPERS
Cable and hydraulically operated



2-WHEEL HYDRAULIC SCRAPERS
Capacities: 3-5-6-8 cu. yds.



HYDRAULIC BULLDOZERS with fixed blades, for all Allis-Chalmers Tractors.

GW ROAD MACHINERY Sold through ALLIS-CHALMERS

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, Inc.
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OTHER PRODUCTS OF GAR WOOD INDUSTRIES INCLUDE: HOISTS AND BODIES • WINCHES AND CRANES • TANKS • HEATING EQUIPMENT • MOTOR BOATS

We're All in This! Let's Stop Accidents

"Six Infantry Divisions Wiped Out." You'd have been horrified to read that headline during the war, wouldn't you? More than 96,000 men! Yet last year as many persons were killed right here at home in America. Accidents which probably could have been avoided were responsible.

Horrible and wasteful as it was, the war cost our armed forces 261,608 lives, and 651,911 wounded. On the homefront, over the same period, 355,000 lives were snuffed out by accidents, and 36,000,000 persons, or 1 in every 4 Americans, were injured. No less than 1,250,000 of those injuries were permanent.

The losses of war appall us. What carnage! What waste of manhood! How about the far more staggering losses of peace?

The National Safety Council, active for 33 years in promoting greater safety, is to launch a nationwide fund-raising campaign in May. Known as the Green Cross for Safety, the campaign marks the first time the Council has appealed for general public financial support. It will awaken general interest in accident prevention, and should serve to reduce our staggering present-day expenditure of human life and happiness. And it will help the Council to extend its work . . . a work that means much in making a strong America. Give the Green Cross for Safety your full support!

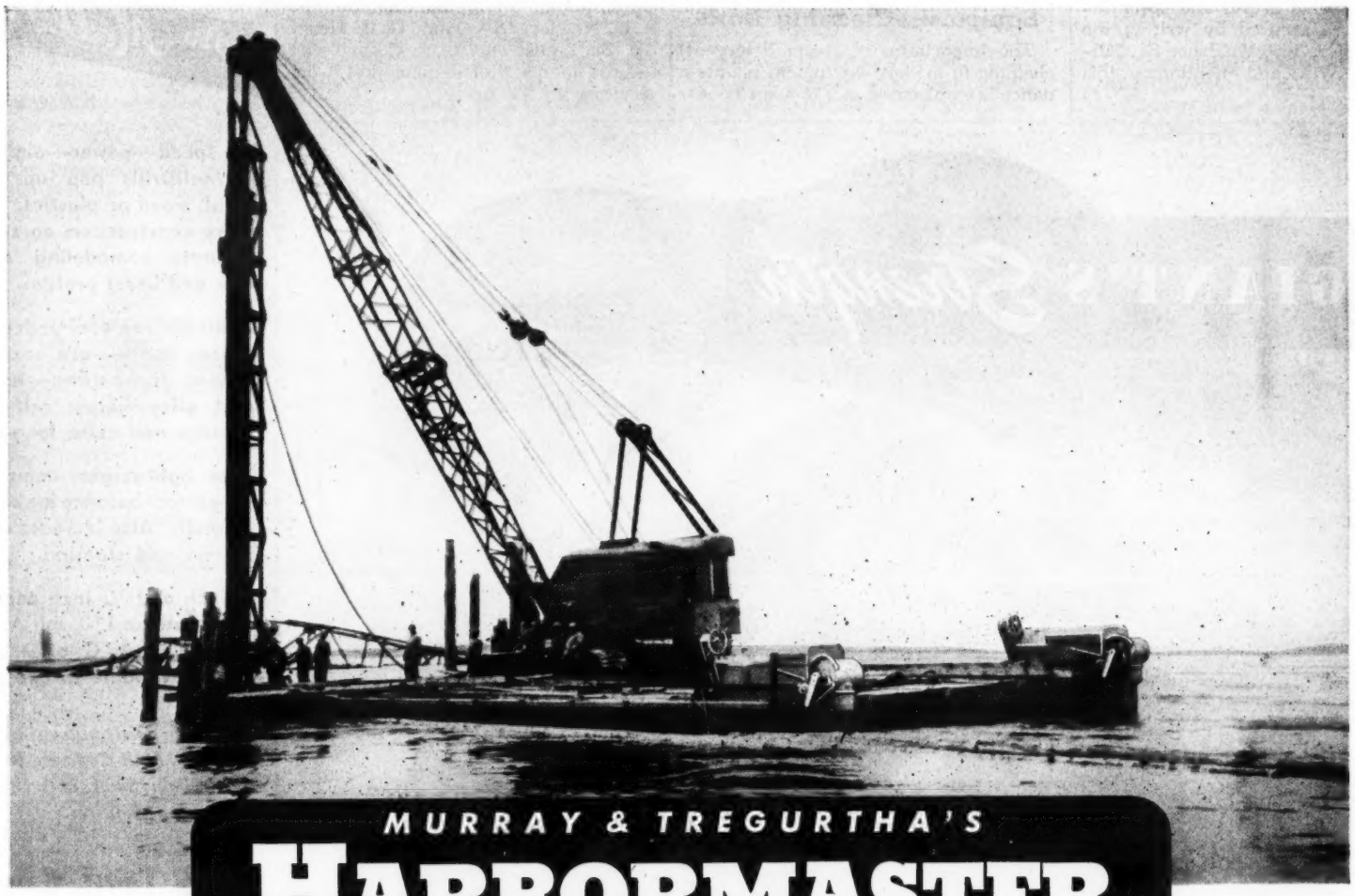
Le Roi District Managers

The appointment of eastern and western District Managers has been announced at Milwaukee by the Le Roi Co., manufacturer of engines, air compressors, generator sets, and specialized highway and airport mowers. Thomas V. Shea will serve as Eastern Manager, with offices in New York City's Empire State Building, while William Z. Bancroft will supervise the Western District from San Francisco.

Holder of the Legion of Merit for his service with the Army Engineers, Mr. Bancroft retired recently as a Lieutenant Colonel. During the war he served as Executive Officer to the Director of Military Construction. He was previously with the Compressor Division of the Sullivan Machinery Co. Mr. Shea, an Annapolis graduate, has been associated with the Phillips Petroleum Co. in Chicago and Detroit. Since 1943 he has been Staff Engineer and General Supervisor of Fuel Systems and Equipment for the A. O. Smith Corp., Milwaukee.

E. J. Buttenheim Given Late Editor's ARBA Post

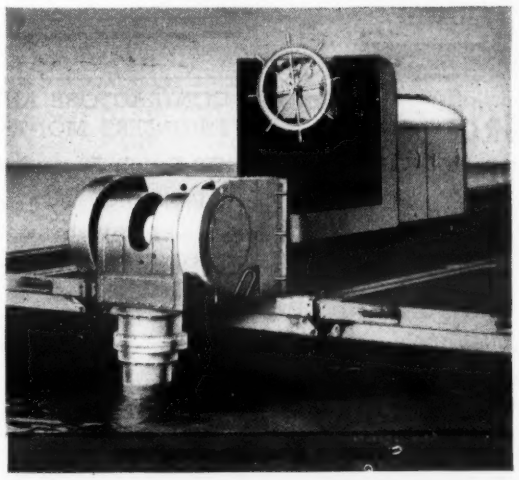
Succeeding his long-time friend and colleague, the late Theodore Reed Kendall, who was for twenty-five years Editor of CONTRACTORS AND ENGINEERS MONTHLY, Edgar J. Buttenheim, Publisher of this magazine, has been appointed to the Board of Directors of the American Road Builders' Association.



MURRAY & TREGURTHA'S

HARBORMASTER

Power • • 360° Maneuverability • Highest Maintenance Efficiency



These, plus many more operating acmes, are yours with all "Harbormaster" models, ranging from 20 H. P. to 330 H.P., gasoline or diesel powered. Applicable to workboats, tug and towboats, lighters, barges, fishing craft and many other inland and coastal vessels, these heavy duty units deliver more thrust per horsepower than any other conventional propelling and steering equipment! Write today for details on these ultra-modern, heavy duty "Harbormasters"—the rugged, economical Units that deliver the goods in all waters!

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Rex 3½-S Concrete Mixer of New Design

A redesigned Rex end-discharge concrete tilting mixer in the 3½-S class has recently been announced. The unit weighs 150 pounds less than the former Rex side-discharge model, and is said to be easier to hitch and spot. The body is cradled between the wheels for a lower center of gravity, and the wheel tread has been increased to 62 inches, approximating that of automobiles.

Other features of the new Rex 3½-S include a choice of two engine sizes, an enclosed roller chain motor-drum drive, an all-welded pressed-steel drum bowl, a replaceable ring gear for driving the drum, a 24-inch control handwheel equipped with a safe ratchet-type lock, cantilever springs, and a removable tow pole.

More complete details and specifications may be secured by writing the Chain Belt Co., 1666 W. Bruce St., Milwaukee 4, Wis., and mentioning this news item.

A redesigned 3½-S end-discharge tilting mixer which has been announced by Chain Belt.

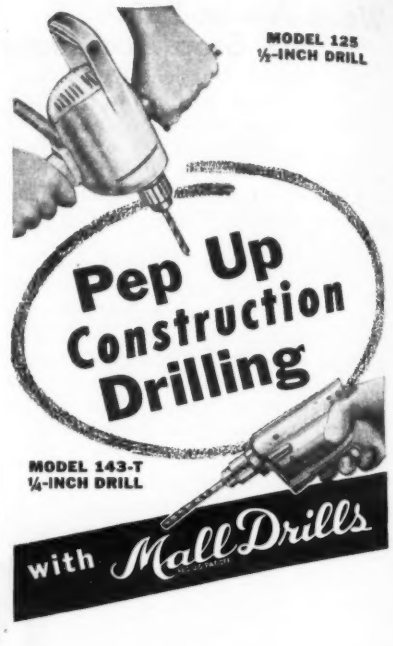
Equipment-Cleaning Data

The importance of steam detergent cleaning in modern equipment maintenance is emphasized in a 28-page booklet issued by Oakite Products, Inc., 57 Thames St., New York 6, N. Y. The pamphlet describes the application of this cleaning method for preparing equipment and parts for repair and overhaul, repainting or refinishing, for paint stripping, and other uses. Emphasis is placed on the savings in time, money, and labor effected by the steam cleaning method. Various Oakite steam guns are shown.

Copies of this booklet can be obtained by interested equipment maintenance men who write to the company and mention this notice.

Lincoln Engineers Named

The assignment of welding engineers at various offices has been announced by the Lincoln Electric Co., Cleveland, Ohio, as follows: Omer W. Blodgett, Grand Rapids; Frank Boucher, Detroit; R. K. Kewley, Cleveland; G. B. Moseley, St. Louis; and L. J. Cogan, who returns to his Philadelphia post from service with the Army.



The speed—power—and endurance of MallDrills pep up drilling in metal, wood or plastics. They keep heavy construction on schedule — facilitate remodeling and repair work and boost profits.

MallDrills run cool under long, continuous use — are easily serviced without dismantling—have special steel alloy gears, self-lubricating bearings and extra long brushes.

Their lightweight, compact design and perfect balance make them easy to handle. Also increase workers' efficiency and stamina.

¼-inch and ½-inch capacity models operate on 110-volt A. C. or D. C. or 220-volt A. C. or D. C. ¼-inch drill is available in two speeds.

Ask Your Distributor for MallDrills, Mallsaws, Mall Concrete Vibrators, and Mall Chain Saws or write direct for literature and prices.

Mall Tool Company
7743 South Chicago Avenue
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★ 25 Years of
"Better Tools For Better Work"

Vapor pressure, during the critical curing period, creates a terrific hydrostatic force equivalent to 100 lbs. per square foot at 90°F. The tenacious binding action of Kapco's membranous film holds fast and affords 95% water retention, assuring superior pavements. Easily applied by newly designed mechanical spray methods, Kapco provides coverage of 200 square feet per gallon.

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Eliminate bottlenecks with all your paving joints and accessories from one source.

- *Mastic Board Tongue & Groove Joints*
- *Mastic Board Dummy Joints*
- *Fibre & Asphalt Expansion Joints*
- *Kapco 336 Sealing Compound*
- *Subgrade papers*
- *Sewer Joint Compounds*

Write today for your free copy of the new 1946 Keystone Paving Products specifications catalog. Dept. C.

KEYSTONE ASPHALT PRODUCTS COMPANY
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GENERAL OFFICES: 43 E. OHIO ST., CHICAGO 11, ILL. MFG. PLANT: CHICAGO HEIGHTS, ILL.

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N. B., Cash, check or postage stamps will be entirely acceptable.

Bridge Reconditioned At Cost of $150,000

Structural Repairs Made By Welding; Old Flooring Replaced by Steel Mesh to Rehabilitate River Crossing

By W. H. TOWNSEND, District Construction Engineer, Illinois Division of Highways, Peoria, Ill.

✦ There are two bridges across the Illinois River between Peoria on the westerly bank and the highly industrialized city of East Peoria on the other side. These two structures carried a peak of 29,000 vehicles before the war and an average of 22,000 daily during the emergency. To relieve this congestion, the Illinois Division of Highways, prior to the war, had let contracts and was building a new high-level bridge across the river in the northerly part of Peoria. The emergency, of course, required the suspension of construction of this bridge, due to restrictions on steel and other war needed construction materials.

The Cedar Street Bridge, which is a four-lane high-level bridge between the two cities, was constructed twelve years ago. The other bridge at Franklin Street, more centrally located between the two population areas, is a two-lane low-level bridge that carries approximately 65 per cent of the traffic crossing the river. This bridge was constructed in 1911 and during its life had not received any major structural repairs. It is known locally as the Franklin Street Bridge and is composed of 20 spans, including three steel truss spans, each approximately 187 feet in length, a bascule draw span 174 feet in length, and a steel arch 110 feet in length, which comprise the portion of the structure spanning the river at ordinary river stage. The remaining, or approach, spans are girders, I-beams, and concrete slabs, the latter built on earth fills constructed between retaining walls.

The existing floors on the three truss spans were creosoted subfloors with bituminous-plank wearing surfaces. The bascule and arch spans had creosoted-timber subfloors with creosoted-plank wearing surfaces. Under the heavy traffic load and action of the elements for many years, some of the main steel members, particularly connections in the lower chords of the truss spans, had rusted and deteriorated considerably; also the wearing surface had worn to such an extent that it was necessary that repairs be made immediately.

Plans for Reconditioning

The Illinois Division of Highways and the City of Peoria entered into an agreement whereby repairs were to be made and the bridge modernized as a joint project. Plans were prepared and a contract awarded by the State for structural repairs, new wearing surfaces, and a complete three-coat painting job, including one red lead and two aluminum coats. In the preparation of plans, consideration was first given to using concrete floors throughout, but due to the increased dead load, investigations were made of other types of material that would meet the conditions. Finally it was decided to use steel-mesh flooring on the truss, bascule, and arch spans.

The remaining spans were surfaced with bituminous concrete, Illinois Specifications Sub-Class I-11, which is a dense-graded-aggregate hot plant-mix. This type of surfacing was placed on the existing concrete subfloors, using a bituminous leveling course in preparation for the surface which was placed in two layers, a 2½-inch binder course with 1½-inch wearing surface. This surface was placed after the removal of an existing brick wearing surface.

The approaches at each end of the bridge were constructed with 10-inch portland-cement concrete pavement reinforced with mesh.

New steel structural members are being added as needed to reinforce the Franklin Street Bridge. The new mesh flooring is already in place in the foreground.

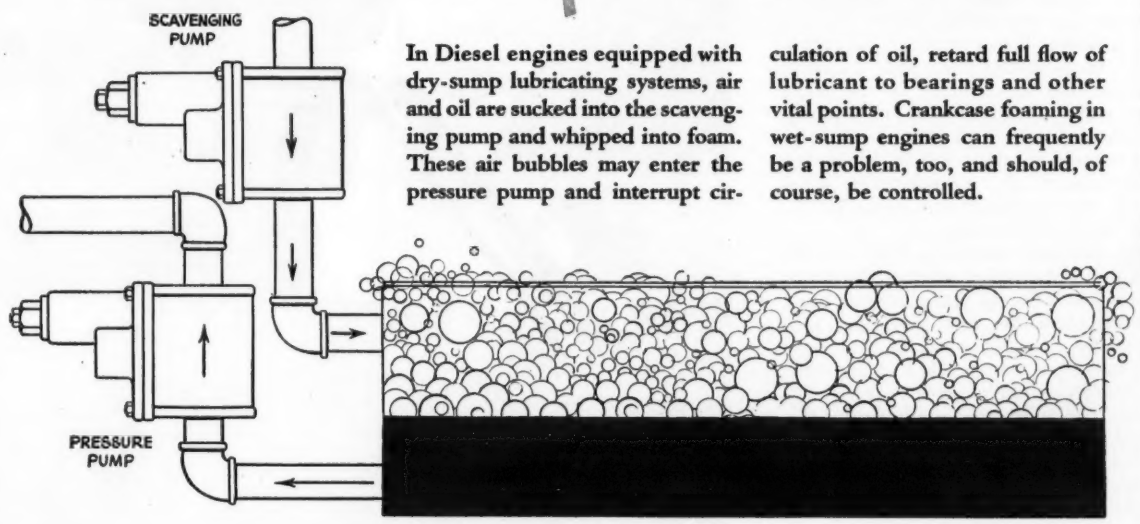
Structural Reinforcement

After the removal of the old floors on

(Concluded on next page)

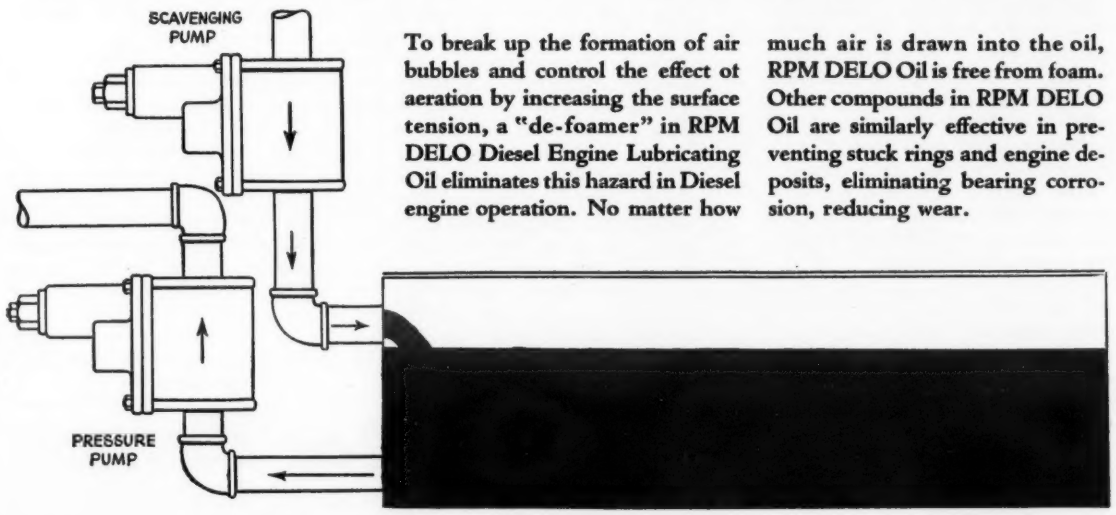
Diesel Engine DANGER points

AIR BUBBLES ENDANGER OIL CIRCULATION



In Diesel engines equipped with dry-sump lubricating systems, air and oil are sucked into the scavenging pump and whipped into foam. These air bubbles may enter the pressure pump and interrupt circulation of oil, retard full flow of lubricant to bearings and other vital points. Crankcase foaming in wet-sump engines can frequently be a problem, too, and should, of course, be controlled.

RPM DELO OIL PREVENTS CRANKCASE FOAMING



To break up the formation of air bubbles and control the effect ot aeration by increasing the surface tension, a "de-foamer" in RPM DELO Diesel Engine Lubricating Oil eliminates this hazard in Diesel engine operation. No matter how much air is drawn into the oil, RPM DELO Oil is free from foam. Other compounds in RPM DELO Oil are similarly effective in preventing stuck rings and engine deposits, eliminating bearing corrosion, reducing wear.

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line—RPM HEAVY DUTY MOTOR OIL—RPM COMPOUNDED MOTOR OIL—RPM GEAR OILS AND LUBRICANTS—RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA · 225 Bush St., San Francisco 20, California
THE CALIFORNIA COMPANY · 17th and Stout Streets, Denver 1, Colorado
STANDARD OIL COMPANY OF TEXAS · El Paso, Texas
THE CALIFORNIA OIL COMPANY · 30 Rockefeller Plaza, New York 20

RPM DELO DIESEL ENGINE LUBRICATING OIL

SAVE 50% ON FUEL AND WAITING TIME when Heating & Melting Tar & Asphalt

USE AEROIL THE FAMOUS HEET-MASTER

55, 80, 115 and 165 gallon sizes on skids, on steel wheels and on pneumatic tires. Send for FREE Bulletin No. 260CE (specifications, prices, etc.)

AEROIL PRODUCTS CO.
5775 Park Avenue, West New York, N. J.
Chicago 16 San Francisco 7 Dallas 1

The Franklin Street Bridge in Peoria, Ill., was recently rebuilt by reinforcing the steel members and laying I-Beam-Lok mesh flooring. Here welders are at work on both repairs and placing flooring.

Bridge Reconditioned At Cost of $150,000

(Continued from preceding page)

the portion of the bridge where the mesh flooring was to be used, it was necessary to reinforce the steel members by adding I-beam substringers and shims on the existing stringers, which also served to obtain the correct elevation and permitted adjustment for the new surface. These auxiliary stringers were spot-welded to the existing stringer. All weak joints in the truss spans were reinforced with steel plates and shapes welded to clean solid steel with continuous fillet welds. When the reinforcement and substringers were placed, the structure was ready to receive the steel flooring.

This material, known as I-Beam-Lok steel floor, was fabricated at the Carnegie-Illinois Steel Corp. plant and built to shop plans for this particular job. The mesh was delivered in mats approximately 6 feet x 25 feet in area, excepting for special sizes required for fitting. The mesh was made up by the use of small modified 5-inch I-beams spaced at 6-inch centers with two parallel steel bars 3/16 x ¼ inch spaced between the I-beams. The cross members were 2½-inch x ¼-inch steel bars spaced at approximately 3-inch centers. These were notched for dovetailing with the filler bars and slotted through the I-beams. This assembly formed the wearing surface of the mesh. The mats were also reinforced by tying at 1-foot centers. This entire assembly was welded to the stringers and connected with each adjacent mat by continuous fillet welds at each point of contact.

A flat-bottom truck with a small A-frame derrick on the rear and a drum-driven hoist backed onto the bridge, delivering the mats and placing them in their final position for welding which was done by six electric units.

The adjustment made in the grade line over the bridge has produced a very much improved surface and it is expected that the bridge, with normal maintenance on the surface and painting the structure, should serve at least twenty-five years more. The total completed cost of the project was approximately $150,000.

Personnel

The preparation and completion of the project was under the supervision of Wesley W. Polk, Chief Highway Engineer, with detail supervision handled by District 4, Theodore Plack, District Engineer. D. J. Deyoe was Resident Engineer. L. D. Jeffries, Commissioner of Public Works, represented the City of Peoria.

The contract for this work was awarded to the Zimmerly Construction Co., of Paris, Ill., which was required to complete the entire project so as to permit the opening of the bridge within 45 working days as specified in the contract. The structure was ready for opening to traffic on September 1, 1945.

Huge Reclamation Program

Working plans for a $140,000,000 construction program, the largest in the agency's 43 years, were discussed by Bureau of Reclamation engineers from Denver and seven regional offices and top-ranking officials at a two-day conference in Washington recently.

Chicago Representative

E. S. McCormick, recently a Lieutenant in the Seabees, has been appointed representative for the American Hoist & Derrick Co. in the Chicago district, with headquarters at 111 W. Washington Street. Prior to entering the Navy, Mr. McCormick served at the home office in St. Paul, Minn.

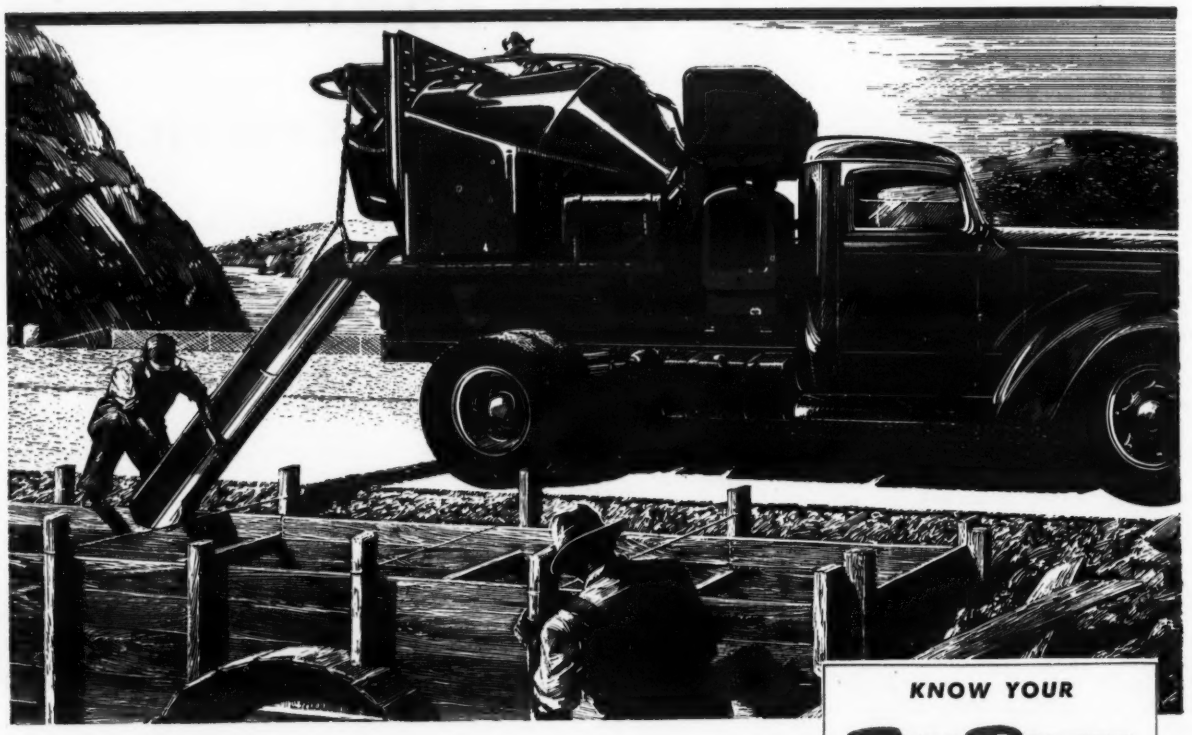
Hathaway in ASCE Post

Gail A. Hathaway of the Office of the Chief of Engineers has been named Vice President of the American Society of Civil Engineers, succeeding to the post held by the recently deceased A. C. Polk of Birmingham, Ala. Senior director of the Society's second zone, Mr. Hathaway has been active in meteorological studies. Other works completed by him include the hydraulic design of Fort Peck Dam.

Hydraulic Earth Borer

A self-contained boring unit, the Jaques earth-boring machine, is described in a new folder available from the Jaques Power Saw Co. The bulletin lists the various features of the new improved machine, including its hydraulic control and independent power unit, and the illustrations show it in action. Copies can be procured by addressing the firm at P. O. Box 695, Denison, Texas.

HI-UP... IN NAME, REPUTATION AND QUALITY



Flexibility, engineered into all Ransome Blue Brute Truck Mixers, reaches its peak in the new Hi-Up. This flexibility eliminates all strains resulting from misalignment while charging, discharging, or operating over uneven ground. The truck mixer is designed so that when discharging is completed, all moving parts return to their normal positions.

The transmission shows a marked advance over usual design. Enclosed water pump clutch requires no adjustment and at no time is there any need for manual lubrication. A separate engine clutch, two speeds forward and reverse, and multiple disc clutches assure easier starting, a wider performance range and smoother operation.

Other new design details: Unbreakable, anti-freeze gauge glasses, in full view of the operator . . . Quick-charging, unobstructed hopper, with improved sealing door, prevents jamming . . . Positively leak-proof poppet valves with renewable discs — found only in Ransome Truck Mixers . . . Exclusive mixing drum design, with new type spiral blades, for quick charging and fast, clean discharging.

These are but a few of the reasons why the Blue Brute Hi-Up is setting a new high in truck mixer performance — and offering time-saving, trouble-free production of better concrete at lower cost.

Get the whole story from your nearby Worthington-Ransome dealer, or write for Bulletin No. 221.

R6-7

KNOW YOUR BLUE BRUTES

Your Blue Brute Distributor will gladly show you how Worthington-Ransome Blue Brute Hi-Up Truck Mixers and other construction equipment can put your planning on a profitable basis — and prove that *there's more worth in Worthington.* His name is listed on Page 27. Blue Brutes include:

RANSOME EQUIPMENT

Pavers, Concrete Spreaders and Finishers*, Portable and Stationary Mixers, Pneumatic Placing Equipment, Truck Mixers, Plaster & Bituminous Mixers and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Contractors' Pumps* and Accessories.

*To be announced.

BUY BLUE BRUTES

WORTHINGTON

Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

Latin-Americans Study U. S. Highway Methods

Carrying the "good neighbor" policy to practical levels, twenty-one young engineers from fifteen Latin-American nations have begun a year's training in American road-building methods under the Inter-American Highway Training Awards sponsored by the American Road Builders' Association.

Several weeks will be spent in Washington where preliminary indoctrination and lectures will be given. Late in May the engineers will begin a 6-week bus tour of the Middle West, visiting construction-equipment factories, state highway departments, and actual road projects. This period will be followed by 36 weeks of practical field work, during which the trainees will be assigned to duty with state and county highway departments, and with manufacturers to learn how equipment is built, handled, and maintained. Four weeks of laboratory work and evaluation will conclude the program, following which a week-long traffic-control course may be elected.

Highway departments in twenty states, eight counties, and various cities, about fifty manufacturers, the Office of Inter-American Affairs, the Department of State, the Public Roads Administration, and the Pan American Highway Conference are cooperating in the program.

New Solvay Executives

Col. John H. Elleman has been appointed Manager of calcium chloride sales by the Solvay Sales Corp., New York City. On terminal leave from the Army Engineers, Colonel Elleman succeeds George H. Kimber who resigned to become Managing Director of the Calcium Chloride Association. The Colonel has been District Engineer at Syracuse, N. Y.

A veteran of the Alaska Highway, this reconditioned Tournapull is now moving sticky clay on McVaugh-Haynes' 4,500,000-yard contract at the Dubuque, Iowa, Airport.

Harry C. Todd, for 19 years Assistant Sales Manager in the Calcium Chloride Division, has been named Manager of Advertising and Sales Promotion.

Worthington-Ransome Blue Brute Distributors

See ad on page 26 for list of equipment in each line

Worthington-Ransome Distributors

Ala., Birmingham, J. D. Pittman Tractor Company
Ala., Montgomery, Burford-Toothaker Tractor Co.
Alaska, Anchorage, Airport Mach. & Storage Co.
Cal., L. A., Golden State Equip. Co.
Cal., San Francisco, Coast Equip. Co.
Colo., Denver, Power Equipment Company
Conn., New Haven, Wilhelm-Davies Co., Inc.
Fla., Miami, Allied Equip., Inc.
Orlando, Highway Equip. & Supply Company
Tampa, Epperson & Company
Ga., Atlanta, Tractor & Machinery Company
Ida., Boise, Olson Manufacturing Company
Ill., Chicago, Chicago Construction Equipment Co.
Maine, Portland, Maine Truck-Tractor Company
Mass., Allston, Boston, Clark-Wilcox Co.
Mich., Muskegon, Lakeshore Machy. & Supply Co.
Minn., Minneapolis, Phillippi-Murphy Equip. Co.
Miss., Jackson, Jackson Road Equip. Co.
Mo., Clayton, The Howard Corporation
Montana, Billings, Interstate Truck & Equip. Co.
Helena, Caird Eng. Works
N. M., Albuquerque, Bud Fisher Co.
N. Y., Albany, Milton-Hale Machinery Company
Syracuse, Milton-Hale Mach. Co.
New York, Hodge & Hammond, Inc.
N. D., Fargo, Smith Commercial Body Works, Inc.
Ohio, Cincinnati, Carroll Edwards Co.
Ohio, Dayton, Carroll Edwards Co.
Okla., Oklahoma City, Townsco Equip. Company
Oregon, Portland, Andrews Equip. Service
S. C., Columbia, Smith Equipment Company
S. D., Sioux Falls, Phillippi-Murphy Equip. Co.
Rapid City, Phillippi-Murphy Equip. Co.
Tenn., Nashville, Dempster Bros., Inc.
Knoxville, Dempster Bros., Inc.
Tex., Amarillo, T. W. Carpenter Equip. Co.
Dallas, Shaw Equip. Co.
Utah, Salt Lake City, J. K. Wheeler Mach. Co.
Vt., Barre, A. M. Flanders, Inc.
Wash., Spokane, Andrews Equip. Service
Wisc., Milwaukee, Drott Tractor & Equip. Co., Inc.

Ransome Distributors

Ariz., Phoenix, Lee Redman Company
D. C., Washington, M. A. Doetsch Mach. Company
Ill., Chicago, Thomas Hoist Company
Ind., Fort Wayne, American Steel Supply Corp.
Ky., Paducah, Henry A. Petter Supply Company
La., New Orleans, Ole K. Olson Company
Md., Baltimore, Stuart M. Christhilf & Company
Mich., Detroit, T. G. Abrams
Mo., Kansas City, Brown-Strauss Corp.
Neb., Lincoln, Highway Equipment & Supply Co.
N. J., Newark, Johnson & Dealaman
N. C., Raleigh, Smith Equip. Company
O., Cleveland, H. B. Fuller Equip. Company
Pa., Philadelphia, Giles & Ransome
Wilkinsburg, Arrow Supply Company
Tex., El Paso, Mine and Smelter Supply Company
Houston, McCall Tractor & Equip. Company

Worthington Distributors

Ark., Fort Smith, R. A. Young & Son
Little Rock, R. A. Young & Son
Ind., Indianapolis, Reid-Holcomb Company
Ky., Harlan, Hall Equipment Sales Company
Louisville, Williams Tractor Company
La., New Orleans, Wm. F. Surgi Equip. Company
Md., Baltimore, D. C. Elphinstone, Inc.
Mass., Cambridge, Field Mach. Company
Mich., Detroit, W. H. Anderson Co., Inc.
Flint, Gransden-Hall & Company
Mo., Kansas City, Mach. & Supplies Co.
N. J., Hillside, P. A. Drobach
No. Bergen, American Air Compressor Corp.
N. M., Roswell, Smith Machinery Company
N. Y., Buffalo, Dow & Co., Inc.
New York, Air Compressor Rental & Sales
Olean, Freeborn Equip. Company
N. C., Raleigh, Carolina Tractor & Equip. Co.
O., Cleveland, Gibson - Stewart Company
Toledo, The Kilcorse Mach. Co.
Pa., Allentown, H. N. Crowder, Jr., Inc.
Easton, Sears & Bowers
Harrisburg, American Equip. Corp.
Oil City, Freeborn Equipment Company
Pittsburgh, Atlas Equip. Corp.
Phila., Metalweld, Inc.
Wilkes-Barre, Ensminger & Company
Tex., El Paso, Equip. Supply Company
San Antonio, Patten Machinery Company
Va., Richmond, Highway Mach. & Supply Co.
Wash., Seattle, Star Machinery Company
Wyoming, Cheyenne, Wilson Equip. & Supply Co.

Our Blue Brutes

Worthington Pump and Machinery Corp.

Worthington-Ransome Construction Equipment Division

Holyoke, Massachusetts

First Showing of the DROTT HI-LIFT LOADER

... built for Oliver-Cletrac Tractors

When extended, bucket is 5½ feet in front of radiator—ample reach for loading trucks. When resting on its shoes, bucket is 1½ feet in front of radiator—easy on tractor when skidding loads.

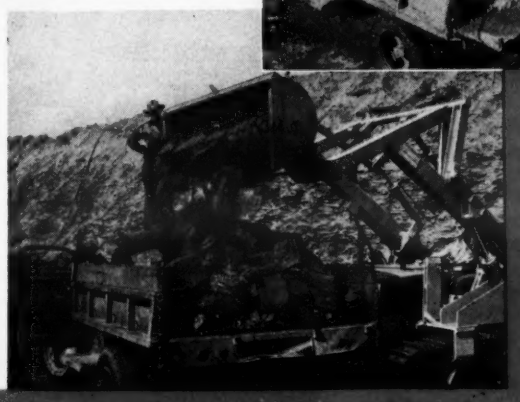
There's plenty of clearance for dumping into trucks—up to 10½ feet from ground to hinge pin of bucket.

A TRACTOR LOADER THAT DIGS LIKE A SHOVEL

Hydraulically operated, the Drott Hi-Lift Loader "bears down" and in as it loads, then tilts upward in shovel fashion, heaping the bucket every time. Increases yardage everywhere . . . on straight excavation or handling of loose material. Easily loads into trucks up to 8½ feet high. Operator has clear vision at all times, digging and loading. When desired, unit may be used for bulldozing. It will pay you to get all the facts. See your Oliver-Cletrac dealer.

* * *

Operated by DROTT POSITIVE, CLOSED HYDRAULIC SYSTEM. SMOOTH • QUICK • DEPENDABLE. Keeps dirt and air out... keeps oil in! Used successfully on Drott equipment for many years.



Quickly excavates and loads dirt or any loose material—shown loading coal (left) and crushed rock (above). On time tests over a long period, it loaded a 3-yd. truck a minute on pit run gravel in Yancy County, Tenn.

DROTT BUILT-FOR-SALE EQUIPMENT

DROTT MANUFACTURING CORP.
(FORMERLY HI-HOW SERVICE CORPORATION)
5141 N. 35th STREET, MILWAUKEE 9, WISCONSIN

Your Red Cross Must Carry On. Give *Now* to the 1946 RED CROSS Fund Campaign

Grouted-Rock Levees On Flood-Control Job

(*Continued from page 2*)

Since the area for the most part is composed of sand and light gravel, it was necessary to use eight Ford water tank trucks, each capable of hauling 2,500 gallons. Wherever fill was placed as a foundation for concrete, as was the case in parts of the by-pass structure, it had to be carried 6 inches outside the neat lines and then cut back by grading equipment to present a uniform, firm foundation.

Grouted-Rock Work

By far the most difficult part of the entire job, both from the standpoint of the contractor and the U. S. Engineers, was the placing of the rock blanket on the earth-fill slope. From the viewpoint of the contractor, some method had to be devised which would spread the rock uniformly at lowest cost. Obviously this method had to be mechanical. That tied in well enough with the wishes of the Army, who desired a uniform 18 to 24-inch blanket of rock with about 40 per cent of voids to insure easy and thorough penetration of the sand-cement grout. Neither the contractor nor the Army wanted a hand-placed job.

Dumping the rock from trucks at the top of the slope therefore would not work at all, due to inaccurate distribution, dirt bridges which prevented the grout from flowing, and subsequent hand work. A steel skip was tried. It was heavily braced to hold 4 cubic yards or half a truckload. Two chain bridles were fastened to the corners, and a 3-yard Lima dragline was brought in to pick it up and swing it up to the levee slope. The rock was dumped into the skip direct from trucks hauling from the quarry about 8 miles away. (See companion article starting on page 2.)

The skip had to be swung up and set down while two laborers unhooked one of the chain bridles. It was dumped by hoisting the remaining bridle. The result was not satisfactory. Invariably the rock fell in a heap. A dozen skips when dumped left just that many separate piles of rock on the slope. When expensive hand labor was then employed to straighten out the rock piles to some semblance of smooth grade, it was discovered that invariably the men chinked the voids and interstices to the point where grout could not penetrate properly, no matter how often they were told to keep them open. It was unsatisfactory from the standpoint of strength, it was excessively costly to Winston-Utah-Vinnell, and since trucks always had to wait before they were completely unloaded it prevented the rock-hauling equipment from operating at full efficiency between job and quarry.

Moreover, in order that blanket rock could be cleaned it had been necessary to pass it through a grizzly. But even with this precaution, it was impossible for the contractor to operate profitably so long as he used the skip and hand placing.

A different system was therefore put into effect whereby the rock trucks dumped their loads on the ground inside the channel about 20 feet away from the edge of the toe trench. Three cranes, a Northwest 80-D, a 3-yard Lima, and a 1½-yard Lorain, all with 60-foot booms, were used to spread the rock. An Owen 2-yard orange-peel-type rock grapple was installed on each machine. The rock grapples handled and placed the rock much more satisfactorily than anything previously tried. It was discovered that when the grapples dug into a pile of smaller-run stone, quite a few of them would be picked up at a pass, but they were scattered to grade, with a minimum of hand placing, by opening the four grapple tongs while the boom was swung over slowly.

Rock grapple sheaves were small, and the severe bending stresses they imposed in the control cables caused some concern. It was a potential source of down time. For this reason, the very best grade of preformed plow-steel wire rope was used exclusively on this job, as well as on the cable-controlled power take-off units of tractor-drawn excavating equipment where precisely the same condition existed. Although its initial cost is somewhat higher than the older style non-preformed rope, the extra hours of high-cost crane performance with the incidental labor involved certainly proved to be a money-maker here and justified its use.

Use of a rock grapple also screened out many of the smaller quarry spalls and dirt from the levee rock. It is this smaller material which caused dams

(*Concluded on next page*)

NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL SIZES AND MODELS

VIBER HIGH-SPEED VIBRATORS

PHONE YOUR DEALER TODAY

In the field for years, VIBER internal concrete vibrators have been delivering constant satisfactory service under all job conditions. VIBERS speed up the job, providing the highest vibration speed in concrete—over 9500 RPM!—at 110 Volts. Easy to work with, portable, rugged—no wonder VIBER gets the call! VIBER'S simplified design with complete interchangeability of parts including power units (electric, pneumatic or gasoline) further eliminates costly delays and lowers costs. So specify VIBER-ation (not ordinary vibration) and put VIBERS on the job.

VIBER COMPANY

726 South Flower Street, Burbank, California

ORIGINATORS OF INTERNAL CONCRETE VIBRATION

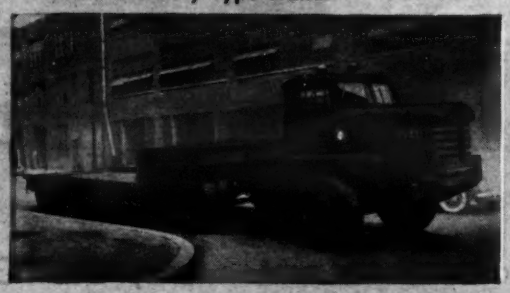
NOW HAUL 20 CU. YD. LOADS ON OFF-THE-ROAD JOBS!

300 H.P. Walter Tractor Truck with 20 Cu. Yd. Side Dump Trailer

250 H.P. Walter Tractor Truck with 12 Cu. Yd. Back Dump Body

Walter Tractor Truck with Concrete Mixer

125 H.P. Walter Tractor Truck with Low Bed Machinery Type Trailer



WALTER Tractor Trucks haul huge yardage per truck on the tough jobs usually considered possible only for small trucks or crawlers. Walter Tractor Trucks combine payload capacity with enormous power, high speed and positive traction—yet maneuver like smaller trucks. Their non-spin, positive FOUR wheel traction keeps them hauling when other trucks are stopped by soft dirt, deep mud, slippery surfaces or steep grades. Specially constructed for gruelling off-the-road work, they are lower in repairs, higher in availability than other trucks. Their use permits you to reduce hauling units, relieve truck congestion and speed jobs. Write for literature describing Walter Tractor Trucks in detail.

Outstanding Features of WALTER TRACTOR TRUCKS

WALTER FOUR POINT POSITIVE DRIVE prevents wheel spinning and provides more efficient conversion of engine power into tractive power.

THREE AUTOMATIC LOCKING DIFFERENTIALS proportion the power to the FOUR driving wheels according to the traction of each wheel at any instant.

SUSPENDED DOUBLE REDUCTION DRIVE is suspended above, not carried in axles, thus it is not subject to load strains or damage from high crowns or stumps. This construction also reduces unsprung weight and increases gear efficiency.

TRACTOR TYPE TRANSMISSION affords wide range of gear ratios.

ENGINE-AHEAD-OF-WHEELS design provides correct weight distribution and short wheelbase.

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave.
Ridgewood 27
Queens, L. I., N. Y.

WALTER TRACTOR TRUCKS

Grouted-Rock Levees On Flood-Control Job

(Continued from preceding page)

and bridges down under the larger rock and prevented grout from entering when skips were used in placing stone. No attempt was made to take the stockpiles up too clean with the grapples, since all residual stone was reclaimed later by a McCaffrey rock picker mounted on an Allis-Chalmers HD-7 tractor, but the combination of grapples and this rock picker made it possible to discontinue the grizzly. The McCaffrey rock picker is a front-end loader with a grizzly bottom built in the dipper. Instead of a conventional-type bottom, the rock picker has 6-inch slots which permit the sand and dirt to drop out.

For each linear foot of levee, about 4 tons of blanket stone and the same amount of derrick stone in the toe were required. Before the job was 50 per cent complete, three cranes reached the performance rate of 400 to 500 tons placed per machine in a 9-hour shift. Only three laborers were employed with each crane.

Grouting

Grout mix for the rock blanket was designed on a water-cement ratio of 8 gallons per sack, 7½ sacks per cubic yard, with sand for the mineral filler. No pea gravel was used in this mix.

The grout was batched from the central plant of the Triangle Rock Co., and hauled out to the job by a fleet of 4-cubic-yard truck-mixers. The number varied from day to day, depending on the size of pour. Eight machines were used when 604 cubic yards of grout was placed. This was the record up to the time the job was covered for CONTRACTORS AND ENGINEERS MONTHLY.

The section to be grouted was examined the day before the pour by the rock foreman and the inspector. Dirt bridges and rock pockets too tight for grout were taken out by a small labor force, and the material thrown into the toe trench. Holes were replaced with rock. Water was hauled to the job by a Ford flat-bed truck, upon which the contractor had mounted a 3,000-gallon water tank. Water was applied under pump pressure to the rock blanket, cleaning each stone before the grout was poured.

Haul roads were maintained on top of each levee and groin for the passage of the truck-mixers. Grout was allowed to flow by gravity from the truck-mixer spouts towards the bottom of the slope. A gang of seven laborers, each man equipped with a stiff bristle push broom, brushed the grout down into rock crevices. Finished levee facing appears rough and durable, with sharp points of blue granite blanket rock projecting through the grout. Membrane curing solution was applied by spray after the grout took its initial set.

From 1.1 to 1.6 cubic yards of grout were required per linear foot of levee face. Material was ordered on that basis, chopping off the pour by telephone at the end of the day.

Derrick stone was then dumped at the same location where blanket stone had previously been stockpiled, and bulldozed into the toe trench by a LeTourneau blade mounted on a Caterpillar D8. The same machine pushed streambed material in over this toe rock, and rough-graded the borrow-pit slopes where construction work had roughened it.

Dewatering for Concrete

An average of about 8 cubic feet per second flowed underground down Cajon Creek during the summer months. It was enough to make dewatering necessary along the toes of all concrete footings. A wellpoint system with pumps was rented for this operation, and worked successfully. About 200 linear feet of footings could be dewatered at once. Five Rex and Gorman-Rupp 2½-inch pumps were also used.

Equipment

At the peak of construction, the following major units of heavy equipment were necessary:

3 Caterpillar No. 12 motor graders
1 Austin-Western 99 motor grader
20 Caterpillar D8 tractors
2 Caterpillar D7 tractors
8 Ford-mounted water tanks
10 Kohler 7½-kw light plants
1 Caterpillar 15-kw motor generator set
1 Ransome 34-E dual-drum paver
5 Rex and Gorman-Rupp 2½-inch pumps
20 Ford and GM pick-ups
10 1½-ton flat-bed trucks
7 LeTourneau 20-yard Carryalls
9 Wooldridge 18-yard scrapers
6 Super C Tournapulls
5 Maxi 10-yard dump trucks
3 17-yard Euclids
25 Ford, Chevrolet, and Dodge rented dump trucks
12 Mack 20-yard end-dump trucks
6 Lincoln and P&H welding machines
2 Northwest 80-D shovels
1 Lima 3-yard crane
1 Lorain 1½-yard crane
1 Northwest 1-yard crane
1 Lorain 40 truck crane
1 Link-Belt 1-yard dragline
1 transport truck and trailer

Personnel

During the major portion of this construction program, the Los Angeles Engineer District was headed by Colonel Rufus W. Putnam, District Engineer, with Lt. Col. Oliver H. Ochsner as Operations Officer. F. C. Bennett was Resident Engineer, succeeded by James G. Morgan. For the San Bernardino County Flood Control District, Howard L. Way, County Surveyor, is Chief Engineer. R. V. Ward is Assistant Engineer, and Ralph W. Motherspaw is Construction Superintendent. B. L. Richards was General Superintendent for Winston-Utah-Vinnell.

The thing about this job which makes people nearby draw a deep sigh of relief is the fact that the destructive floods of the past were only a guide to what might have happened. The maximum predictable run-off possible made the design engineers shudder.

Now the job is nearly finished and the valley residents feel better. The concrete rectangular channel below Foothill Boulevard is completed, and the concrete weir, which will by-pass excess Cajon Creek flow over to the east branch of Lytle Creek, is finished. The intake and by-pass levees are complete. So is Muscoy Levee and groin, and the Upper Devore Levee . . . or so nearly so that no one could quibble about it. The project has brought much needed flood protection to the valley in general and particularly to the existing railroad facilities.

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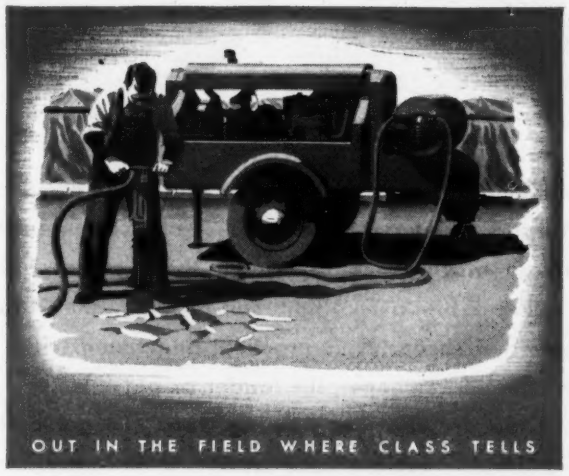
21 Years of Engine Building Experience—The Background That Gives Character To Chrysler Industrial Engines



CONCEPTION*... Back in 1924, Chrysler introduced a new conception of the internal combustion engine—compact, high compression, flexible horsepower. Ten million Chrysler-built engines prove the value of this conception.

The basic principles incorporated in Chrysler Industrial Engines have resulted in the immediate approval and acceptance of these efficient, economical and portable power units by various manufacturers of industrial equipment.

It is significant that, during the war, more than 250,000 Chrysler Industrial Engines furnished rugged, economical power for many types of equipment purchased by the government.

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*One of the 8 *character points* in the Chrysler Industrial Engine Pedigree

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Four definite characteristics of Chrysler Industrial Engines are flexibility, efficiency, economy, long life.

These engines are designed, engineered and built completely in the great Chrysler plant. With full control of the manufacture and function of every component part, the greatest flexibility, efficiency, and economy are built into Chrysler Industrial Engines. Long life—too—is assured by Chrysler exclusive process of Superfinishing parts subject to wear.

Chrysler Industrial Engines, in practical application, prove the fine qualities and character built into them through engineering research, superior design and the finest craftsmanship. Here is truly "Horsepower With A Pedigree".

Low cost is assured Chrysler Industrial Engine users—whether installed in air compressors, shovels, cranes, pumps or other applications in construction.

Attention Dealers: Some desirable Chrysler Industrial Engine territories are available. Write to the Chrysler Industrial Engine Division for complete information.

"LISTEN TO THE MUSIC OF ANDRE KOSTELANETZ, THURSDAYS, CBS 9 P.M., E.S.T."

CHRYSLER INDUSTRIAL ENGINES
Horsepower with a Pedigree

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Please send the Chrysler Industrial Engine Catalog.
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Address
City State

F-A Road Work Can Be Done by Counties

Approval will be given, in certain cases, to the construction of Federal-Aid roads by county highway forces, the Public Roads Administration has announced. This exemption has been set up for certain classes of secondary roads where the character of the work or the circumstances surrounding the project make it unsuitable for economical construction by the contract method, Commissioner Thomas H. MacDonald says.

The county must show that it is adequately organized and equipped to do the work and that the cost is reasonable. Projects that might be deemed suitable for county construction include light grading and surfacing, and the installation of permanent culverts as stage construction. Work will not be approved where the county would have to purchase construction equipment which it does not require for normal operations.

"Dammit! Those engineers have built a road into this wilderness before we've had a chance to explore it!"

State highway departments will be responsible for the supervision and inspection of such projects on the same basis as contract work. All details of the work are to be clearly agreed to by the county and the state. The state will be reimbursed by the Federal government on the basis of the work performed. The unit prices must not exceed comparable contract costs, and the use of county equipment will not be considered as a partial contribution in lieu of funds required to match Federal funds, nor will Federal reimbursement be made to cover direct charges for rental or depreciation of publicly owned equipment.

Bridge Machinery Shown

Operating-machinery speed reducers and gasoline power units for use in bridge installations are described in a 16-page brochure recently issued by the Earle Gear & Machine Co. Single, double, and triple reduction gears, with or without differentials, and horizontal and vertical worm-gear reducers are illustrated. Diagrams are given, as are charts showing horsepower ratings and dimensions. Specifications are also included for various gasoline power units. Typical installations of Earle machinery are shown.

Copies of this booklet may be obtained on mention of this item. Write the firm at 4707 Stenton Ave., Philadelphia 44, Pa.

New Wire-Rope Sales Mgr.

Norman R. Downie has been named to succeed Charles M. Ballard on his retirement as Sales Manager for the Wire Rope Division of the Bethlehem Steel Co. Both joined Bethlehem in 1937 when the firm acquired the Williamsport Wire Rope Co., which Mr. Ballard served as Vice President in charge of sales.

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Salt Tablet Dispenser, 500 tablet capacity, extra **$2.75**
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Road Engineer desires position

Civil Engineer, Jun. ASCE, M.S.C.E. Iowa State, 1942. Age 25, married, with 2½ years varied experience in highway and levee construction, highway research, estimating and traffic engineering; 3½ years as Army and Navy Aeronautical Engineering officer. Desires position with consultant, contractor or governmental agencies concerned with design, research or construction in the airport, highway or traffic engineering fields. Location in southwest or Rocky Mountain states preferred.

Address W. F. Kopfler, II,
Box 234, Kenner, Louisiana

Plant-Mix Paving

(*Continued from page 1*)

The contract extended into two counties, Garrard and Lincoln, and included the following road mileage:

Stanford to Lancaster	U. S. 27	9.0 miles
Lancaster to Crab Orchard	State 39	12.0 miles
Stanford to Hustonville	State 78	10.0 miles
Hustonville to Casey County line	State 35	4.0 miles
Towns of Stanford and Lancaster		0.9 miles
Total		35.9 miles

All of the roads are 18 feet wide, although in some sections of the towns the width increases to 58 feet. The original construction of these highways was a traffic-bound macadam of varying age, which had been given a bituminous surface treatment. Over the years this had become rough, broken up under traffic, and raveled along the edges.

The town of Rowland, near Stanford, was centrally located to all these roads, and was picked as a site for the asphalt plant.

Asphalt Plant

The plant was set up along U. S. 150 just outside the town near the main line of the Louisville & Nashville Railroad, from which two spur tracks were laid to bring in materials. Stone for the coarse aggregate was brought to the siding at the east end of the plant in gondola cars over the L & N Railroad after having been purchased from the Kentucky Stone Co. at Mt. Vernon, Ky., 20 miles away. Fine-aggregate stone was bought from the Caldwell Stone Co. at Danville, which delivered the stone with its own 1½-ton trucks and stockpiled it at the plant after a 10-mile haul. Another side track at the west end of the plant was used for the delivery of bituminous material which was purchased from the Ashland Oil & Refining Co. at Ashland, Ky., and shipped in tank cars 175 miles over the L & N.

From the gondola cars or stockpile the stone was transferred by a Lorain crane with a 45-foot boom and a 1-yard clamshell bucket to a Hetherington & Berner 25-ton bin which was divided into two compartments, one with a capacity of 17 tons for the coarse stone, and a smaller 8-ton compartment for the fine aggregate. At the bottom of the bin was a proportional feeder with the gate openings set so that about 60 per cent of the stone being discharged from the bin was coarse and the remaining 40 per cent was fine. With this device, screening of the stone before entering the pugmill was eliminated.

From the feeder the stone was delivered to a 15-foot-high bucket elevator on the first step of the processing it was to receive at the Hetherington & Berner 50-ton-an-hour asphalt plant. At the top of the elevator the stone entered a single-drum drier, 26 feet long x 5 feet in diameter, which was heated by a Hauck high-pressure torch burning fuel oil atomized by steam. Heat in the drier was regulated with reference to the temperatures observed on the pyrometer which indicated whether the stone

C. & E. M. Photo
A Ford truck delivers its load of hot-mix to an Adnun Black Top Paver on a 36-mile resurfacing contract in Kentucky.

leaving the drier had been heated to the desired 300 degrees F. The drier was equipped with a 48-inch exhaust fan which drew off the very fine dust from the limestone rock, and conducted it to an 8 x 8-foot dust house where it was sprayed with a shower mist to settle the clouds of "smoke".

After being heated, the stone left the drier and ascended an enclosed 45-foot hot elevator from where it dropped into a 40-ton bin without being screened. Before entering the 1-ton pugmill, the aggregate, as well as the asphalt, was weighed on Kron dial scales.

Handling the Bitumen

In the meantime, the PAC-5 asphaltic cement of 85 to 100 penetration was being heated in the tank cars at the siding with steam furnished by a 30-hp coal-burning horizontal-type boiler located at the south end of the plant. The steam was conducted from the boiler to the car in a 2-inch line, with a ¾-inch pipe for the return, and when the asphalt was sufficiently heated it was pumped from the cars by a Viking 3-inch asphalt pump working off the boiler.

From the cars the asphalt passed through a 3-inch line which was enclosed in a 4-inch jacketed pipe heated by steam to two vertical storage tanks holding 7,500 gallons each. Alongside these tanks the fuel oil was stored in a

(*Concluded on next page*)

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Plant-Mix Paving

(*Continued from preceding page*)

vertical 4,200-gallon tank from where it was pumped to the drier torch by a Viking ¾-inch pump. The asphalt, in its passage from storage tank to weigh bucket and back to tank again, made a continuous loop through a line equipped with a by-pass valve by which the asphalt was released by the plant operator as needed.

Power for the plant came from two Caterpillar diesel engines, one of which operated the bin feeder, the bucket elevator for the unheated stone, the drier, and the pump for the fuel oil. The other diesel ran the hot elevator and the pugmill. Besides furnishing steam to heat the asphalt in the cars, storage tanks, and while in transit through the jacketed pipe lines, the boiler also operated the steam ram on the pugmill discharge gates.

The Mix

The aggregate and asphalt were mixed at a temperature ranging between 275 and 300 degrees F for one minute in the pugmill, and the mix was then discharged into a fleet of twelve Ford trucks holding 6 tons each. The haul from the plant to the farthest point on the job was 16 miles. This mix, which is known as Class F Type B in the Kentucky Department of Highways, had the following gradation and weights for a 1-ton batch:

Sieve Size	Per Cent Passing (by Weight) Coarse Stone Spex	Coarse Stone Typical	Fine Stone Spex	Fine Stone Typical
½-inch	100	100	.....	...
⅜-inch	80-100	81	100	100
No. 4	10-30	19	.....	...
No. 8	0-5	0	60-100	68
No. 20	0-3	0	.....	...
No. 50	.....	...	2-30	14
No. 200	.....	...	0-10	5

Coarse stone	1,130 lbs.
Fine stone	754 lbs.
Bitumen, asphalt cement, 5.6 per cent	116 lbs.
Total	2,000 lbs.

Laying the Mix

In preparation for the black-top surface, the road was first swept by a Littleford power broom pulled by a truck, and then given a light tack coat of RC-2 asphalt at the rate of 0.1 gallon to the square yard. No more bitumen was applied to the road than would be covered with the plant-mix material in the course of the day's operations. The RC-2 was stored in an 8,400-gallon tank at the plant and put on, half width at a time, by a Littleford 735-gallon pressure distributor mounted on a Ford truck.

The paving followed right behind, also half width at a time so that traffic could be maintained. Two Adnun Black Top Pavers were used and, by working them on alternate lanes, time was saved by not having to return the paver to the place where work had stopped on the adjacent lane the day before. This eliminated considerable back-tracking inasmuch as the paver laid an average of 2 miles of 9-foot lane in a 10-hour day. At the end of this run it was moved to the side of the road until the other paver pulled up even with the full-width surface, usually on the next day.

The hot-mix was laid about 90 pounds to the square yard which measured a trifle over 1 inch when spread loose. This compacted under the rolling of a Buffalo-Springfield 10-ton 3-wheel roller to a thickness of from ¾ to 1 inch, but in some especially rough areas more material was used and the thickness of pavement increased to 1½ inches.

In the short sections, measuring less than a mile, in the towns of Stanford and Lancaster a different type of paving was used. Here a binder course, employing the coarser stone, was laid 1½ inches thick, or 150 pounds to the square yard. On top of the binder, natural rock asphalt from Bowling Green, Ky., was paver-spread to ½-inch thickness, or 60 pounds to the square yard.

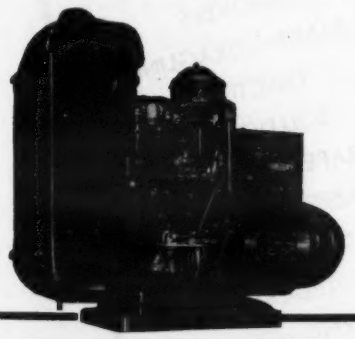
Quantities and Personnel

A crew of 35 men including Donald F. Wilson, Superintendent, was employed by the Carey Construction Co. on this project, with 10 working at the asphalt plant, 12 on the paving phase of the work, and 12 driving trucks. Work was started on July 9 and was finished by October 1. The major items included in the contract were:

RC-2 asphalt, tack coat	48,695 gals.
Black-top plant-mix	21,270 tons
Plant-mix, binder course	1,465 tons
Rock-asphalt seal	590 tons

The job was located in District No. 7 of the Kentucky Department of Highways of which W. F. Johnson is District Engineer. Glenn Vaughan and J. A. Thomas were the engineering representatives assigned to the contract. The Department is headed by J. Stephen Watkins, Commissioner, with Thomas H. Cutler as State Highway Engineer. G. R. Logue is Director, and T. H. Baker is Field Engineer, of the Division of Construction.

In the recent war, from Pearl Harbor to June 1, 1945, American casualties, killed, wounded, missing, and prisoners, totaled 1,012,000. During that same period, home-front motor-vehicle casualties reached a total of 3,200,000, in spite of automobile traffic curtailment.



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Roadside Development In N. Y. Road Program

Every effort will be made to assure the adequate control of highway drainage, the preservation of natural land formations, and the prevention of erosion on lands adjacent to all roadways which are constructed or reconstructed in New York State's $840,000,000 highway program now under way, B. D. Tallamy, Deputy Superintendent of Public Works, told the Soil Conservation Directors of the state recently.

The principles of soil conservation, as they will be applied by the Department of Public Works, and the functions of the Bureau of Soil Mechanics and the newly created Landscape Bureau, were outlined by Mr. Tallamy. Work done by the units is complementary to that being done by the Soil Conservation men, he said, outlining some of the criteria developed for such work as new highways are designed.

Each phase of highway construction is localized in treatment, and is planned to meet specific local needs while remaining a carefully integrated unit in the overall pattern of harmonious and well planned state-wide facilities. The Landscape Bureau will devote itself to roadside design and appearance, while the Soil Mechanics Bureau will deal primarily with subsurface conditions.

Included in the criteria set forth by the Department for its future road work are provisions for the conservation of trees and natural land features, the preservation of wayside springs and groves, the introduction of surface drains, interceptor drains above slope crests, and underdrains, the development of flattened slopes, and proper planting. Immediate treatment will be given soils along right-of-ways, and prompt plantings of suitable vegetation will be accomplished both as an aid in preventing erosion and facilitating maintenance, and for appearance.

Sound land use is one of the fundamental principles in back of all highway design and location, Mr. Tallamy asserted. Highways should be so designed as to promote maximum benefits to adjacent lands, and soil conservation is a vital part of such thinking. Landscaping along the highways now being built will be simple and practical, featuring grasses and native herbs and shrubs rather than elaborate formal plantings. Side slopes will be designed to avoid erosion yet effectively drain paved surfaces, and earth scars caused in construction will be eliminated.

Three New Davey Dealers

Three new dealers have been named by the Davey Compressor Co., Kent, Ohio, to serve New York, South Carolina, and Louisiana. Each will distribute the Davey line of portable and stationary compressors, including the Auto-Air truck-driven units, and Davey's power timber saws. The new outlets are: A. L. Barnum & Son, Seneca Blvd., Burdett, N. Y.; B & H Construction Equipment Co., 835 Meeting St., West Columbia, S. C.; and the Burton Equipment Co., New Orleans, La.

Manhattan Rubber Sales

Harry E. Smith, Vice President of Raybestos-Manhattan, Inc., has assumed complete charge of sales and marketing for the rubber products produced by the firm's Manhattan Rubber Division, Passaic, N. J., and in future will devote all his time to this activity.

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Pipe Bridge Railings Offer Design Variety For New Structures

For the benefit of bridge engineers and designers who are now planning the many spans which are to be erected in the coming highway construction program, a variety of open-type bridge railings utilizing iron pipe is available. Both aesthetic and scenic considerations are said to favor pipe railings. This type of construction permits a wide variety of interesting design combinations, yet sacrifices none of the essential structural strength and durability, it is claimed. Its use allows the passing traveler to enjoy the panorama, and tends to give the span increased wind relief. Finally, because of the relatively few cracks and crevices in pipe railing there is a minimum of corrosive degeneration, according to its champions.

The recently completed Franklin D. Roosevelt Memorial Bridge carrying Highway 70 over the Washita River near Durant, Okla., has been built with this type of barrier for greater scenic enjoyment. Simply designed railings were fabricated by U-bolting straight runs of 3½ and 4-inch wrought-iron pipe to upright beams. These beams in turn were connected to trusses supporting the deck. The structure was designed by Sverdrup & Parcel of St. Louis, in collaboration with the State's Bridge Engineer, Homer X. White, and its construction supervised by the U. S. Engineers.

An example of the interesting and artistic designs possible when concrete and metal are combined in bridge railings is the Sandy Wall Viaduct, Fort Worth, Texas. A railing 40 inches high was made by spacing wrought-iron picket panels between solid concrete posts set about 7 feet apart. A top rail of 3½-inch pipe was welded to a 2-inch channel and inserted into sleeves in the concrete upright. A 4-inch bar channel was set into the piers 11 inches above the curb to form the bottom rail. Another 2-inch channel rail runs 6 inches below the top rail. The pickets were welded to this channel, to the top rail, and to the bottom channel. They were alternately set 4 and 6 inches above the curb line for a pleasant symmetrical effect. These main ¾-inch bars are spaced on 6-inch centers and have between them auxiliary rods which extend from the top channel slightly below the one 6 inches down.

Another design, said to be advantageous and economical insofar as the safety factor is concerned, is that used for several bridges on a Kentucky TVA project. Solid concrete rails, 2 feet high, were used as bases on these small spans, and a single run of pipe installed at the top.

An entirely different design used on the Route 118 highway bridge at Cokesburg, Pa., is said to give high strength and aesthetic value. These railings were fabricated of 6-inch pipe posts set 11 feet apart, with runs of 3½-inch and 2½-inch pipe for the top and bottom rails respectively. Pipe pickets of 1¼-inch thickness were inserted into predrilled holes on 8-inch centers and welded to the top and bottom rails.

Considered to be an outstanding example of simplicity, strength, and durability is the standard bridge-railing specification of the Massachusetts Department of Public Works, which is said to have been adapted by bridge builders in many localities. Used on the Cliff Road Bridge at Wellesley, these railings consist of 2½-inch-pipe top and bottom rails welded to ½ x 1½-inch flat bars which provide a surface for the attachment of vertical pickets. These pickets, ¾-inch round or square bars, are set on 4 15/16-inch centers. Rings formed from 1 x ⅜-inch bar stock are bolted with ¼-inch bolts to the pickets and to a 2 x ½-inch horizontal bar set parallel to the top rail. The rings, it is felt, increase the overall strength of the railing in addition to creating a decorative effect.

The new Franklin D. Roosevelt Memorial Bridge, spanning Washita River, near Durant, Okla., features railings of 3½ and 4-inch wrought-iron pipe to permit an unobstructed view of surrounding areas.

Clay Sewer Pipe Assn. Moves New York Office

The removal of its New York office from 516 Fifth Avenue to 26 Court Street, Brooklyn, has been announced by the Clay Sewer Pipe Association. The action was taken following the appointment of H. G. Carlson as District Engineer. Benjamin Eisner is Chief Engineer for the Association at the new office.

Hard-Facing Data

Designed for a multitude of uses in the shop, tool room, or on a construction job, Excelloy hard overlay metal can be applied to crushing, shearing, digging, and bearing surfaces. The applications of this resurfacing material, its engineering data, and instructions on its use are available from the producer. Mention this notice and ask for the CE folder on Excelloy. The address is: Allied Steel Products, Inc., 7835 Broadway Ave., Cleveland 5, Ohio.

WHEN YOU'RE BACKING IN BATCH TRUCKS
THAT *EXTRA* FOOT *HERE* COUNTS A LOT

● The skip of the Koehring 34-E *Twinbatch* Paver is 10 feet wide, approximately a foot wider than other paver skips. When you're backing batch trucks into a paver skip, fast, that extra foot means a lot. You're in and out just a little faster. And "just a little faster" means big money on a paving job.

For the Koehring *Twinbatch*, that big 10-foot skip is just right because the *Twinbatch* is a big, Heavy-Duty paver, almost 12 feet wide, weighing 60,400 pounds, and every pound working weight.

Double, continuous, self-equalizing cables raise the skip in 8 seconds. Each cable alone is strong enough to raise the loaded skip. Replaceable liners keep abrasive wear away from the skip throat. Welded lip, with extra tire tread plates, acts as a ramp, makes it easier for trucks to get into skip on a rough grade.

KOEHRING 34-E *twinbatch* PAVER
TWO COMPARTMENT DRUM

KOEHRING COMPANY, *Milwaukee 10, Wis.*

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

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We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.
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Guidance for Buying Surplus Machine Tools

Advice and information as to how to go about obtaining Government surplus is given in a small pamphlet, "How to Buy Surplus Machine Tools", just issued by the National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, Ohio. Based on the experiences of manufacturers and on data secured from the War Assets Corp., the 22-page catechism contains valuable suggestions for contractors and state and county highway department officials who are seeking surplus shop tools.

Valuable supplementary information includes a list of War Assets Corp. offices in 47 major cities, with the manager's name, the address, and phone number. Also presented is a table giving the percentages of original cost to be applied in all sales, according to the "Clayton formula", and a listing of the 19 regulations issued by the Surplus Property Administration for property disposal.

Bottom-Dump Wagons For On-Off-Road Hauls

On and off-the-highway earth hauling with Mississippi Wagons is discussed in an illustrated 12-page brochure on these units. One of the features of these Wagons is a hydraulic weight transfer which shifts weight from the front axle of the trailer to the drive axle of the tractor when extra traction may be necessary in rough going.

The Mississippi Wagon, built in three models with capacities ranging from 7½ to 12 struck yards, is pictured and described in the booklet. Specifications are given for the Wagons and for the M-R-S modification of the International diesel wheel tractor which is supplied as the prime mover.

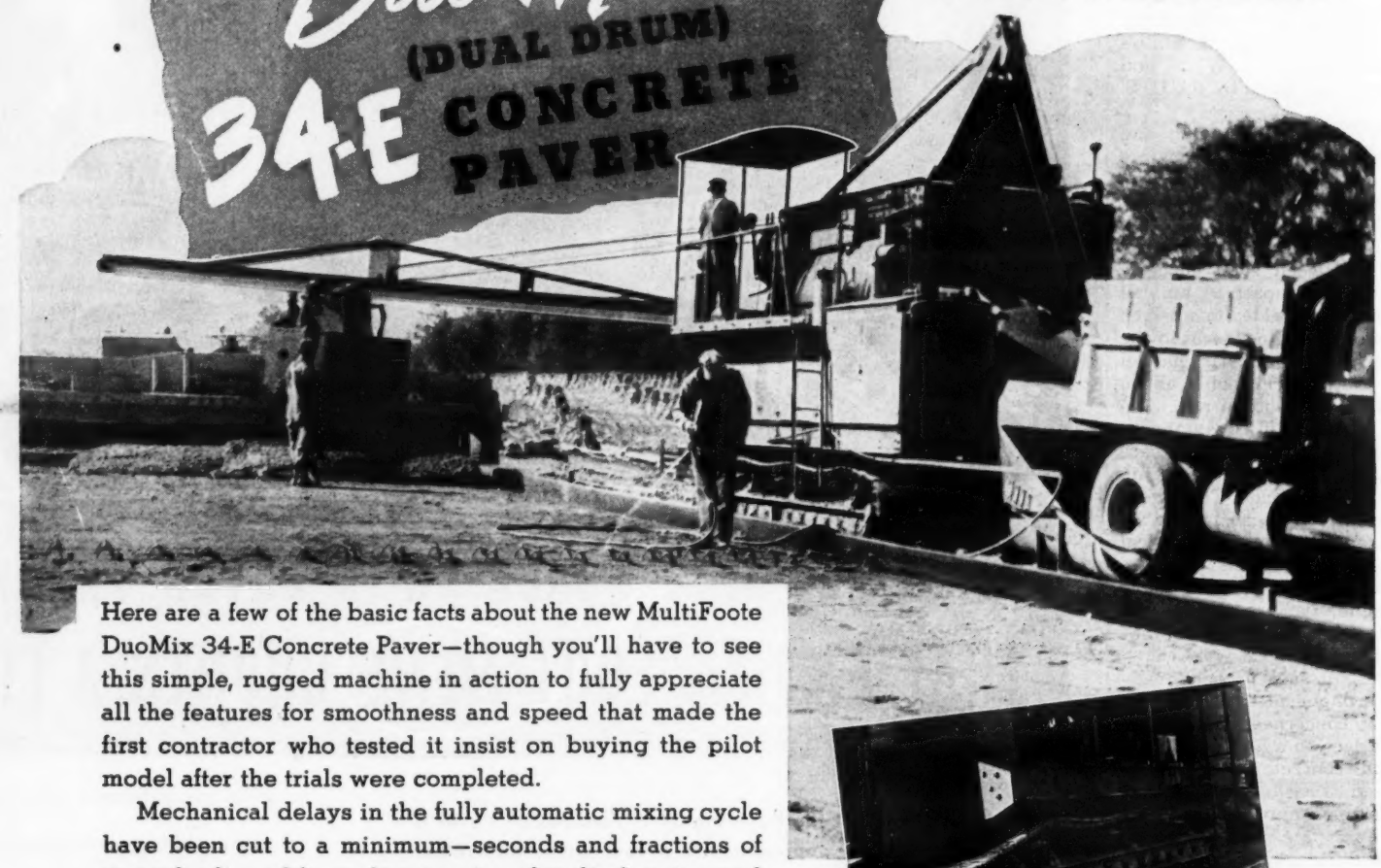
Readers of CONTRACTORS AND ENGINEERS MONTHLY may obtain copies of the brochure, MRS-100, by mentioning this report when writing to the M-R-S Mfg. Co., Jackson, Miss.

Buy U. S. Savings Bonds regularly.

Announcing

THE MULTIFOOTE Duo Mix (DUAL DRUM) 34-E CONCRETE PAVER

- High Speed
- Real Maneuverability
- MultiFoote Dependability for Better Profit Margins on Your Paving Contracts



Here are a few of the basic facts about the new MultiFoote DuoMix 34-E Concrete Paver—though you'll have to see this simple, rugged machine in action to fully appreciate all the features for smoothness and speed that made the first contractor who tested it insist on buying the pilot model after the trials were completed.

Mechanical delays in the fully automatic mixing cycle have been cut to a minimum—seconds and fractions of seconds clipped from charging, transfer, discharging and dumping add up to extra, profit-making batches on each day's work. Under heavy work schedules, there has been no time out for alterations or repairs—MultiFoote dependability worthy of the long line of Foote pavers plus all the MultiFoote advantages that have kept Foote first in the field.

Your order should be in soon for early delivery. Check with your MultiFoote Distributor or write direct today for complete information.

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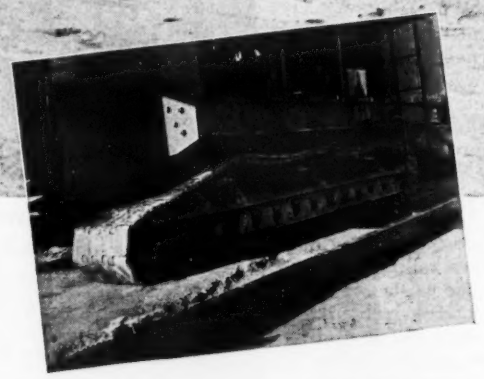


New, Exclusive Crawler Design

No "nutcracker" action between treads on this crawler! Exclusive MultiFoote design provides interlocking joints between alloy cast steel tread plates which prevent entry of stones, no matter what position the tread is in. Single drive lugs, on alternate sides of successive treads are completely self-cleaning and have a ball-and-socket action for uniform bearing pressure even on rough ground.

ARMY E NAVY

MULTIFOOTE CONCRETE PAVERS

ADNUN BLACKTOP PAVER

Traffic-Bound Road Is Surface-Treated

Existing Stone Is Used On Secondary Roads in Low-Cost Improvement By Maintenance Forces

+ THE Division of Maintenance of the Kentucky Department of Highways improved 350 miles of secondary roads last year by putting a bituminous surface treatment on what had been a rather loosely held together traffic-bound macadam stone-base course. In each of the seven maintenance districts into which the state is divided, about 50 miles of roads were selected both on the basis of needing improvement the most, and also of passing on the benefits of a hard wearing surface to the traveling public. For the most part, the roads selected, being in the secondary class, are lightly traveled, and the new topping they received will stand up well until future traffic warrants their being given a more permanent type of paving. The work was done by Maintenance Division forces operating in each district, at a cost averaging $1,500 per mile.

A typical example of such work was the surface treatment given to 5.7 miles on State Route 13 between Jackstown and Carlisle in Nicholas County, about 35 miles northeast of Lexington. This section was the last remaining gap in the Winchester-Carlisle road that did not have a hard-surface paving. It had its beginning 18 years ago when it was constructed as a dirt road. In 1937 it was improved with a layer of stone 3 to 4 inches thick spread over its surface. The gradation of this crushed limestone is 1½ inch down to dust, and every year an additional ⅓ to ½-inch course of stone was added to make up for the stone which was cast off the road by traffic. The stone is 18 feet wide flanked by 4-foot shoulders.

Utilizing Present Stone

Before any work was done on the surface of the road, the ditches were first thoroughly cleaned and opened so that adequate drainage would be provided. For this purpose a Caterpillar steel-wheel pull-type grader, towed by an International TD-18 tractor, was used rather than a rubber-tired-wheel power grader because of the rocky nature of the ditches and backslopes with the resultant wear on the hard-to-get pneumatic tires. The material from the ditches was pulled up on the shoulders where a Galion 101 power grader leveled it off, and the surplus dirt, stone, and vegetation were picked up by an Apcor Force-Feed loader and dumped into four Ford 1½-ton trucks which hauled it to fill sections where it was used to widen the embankments.

The power grader then worked along both sides of the road, pulling all the loose floater stone of the traffic-bound course into a windrow at the center. Care was taken that the blade did not dig deep enough to disturb the already compacted layer of stone beneath, which is 3 to 4 inches thick. The power grader then split this center-line windrow, moving half the material just off the pavement, forming along the edge of the shoulder a shallow windrow of stone about 1 foot wide at the base and from 3 to 4 inches high. The limestone dust was then swept from the 18-foot surface by a Hercules-powered Hough fiber power broom pulled by a Ford truck.

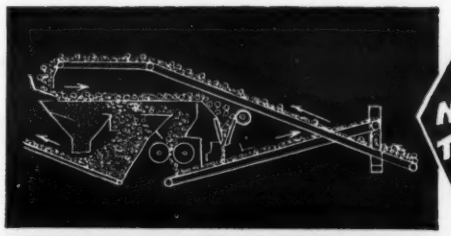
On this clean, firm surface a prime coat of 0.5 gallon of MC-1 asphalt to the square yard was put down in two applications of 0.25 gallon each, with from two to three days intervening between coats. The asphalt was applied half the width of the road through a 9-foot spray bar at the rear of a Littleford 1,200-gallon pressure distributor mounted on a Federal truck. One complete half of the road was done first at a speed of about 4 miles in a 10-hour day. Two or three days after the second prime coat had been applied, the same half of the road was given a tack coat of 0.15 gallon of MC-3 asphalt to the square yard.

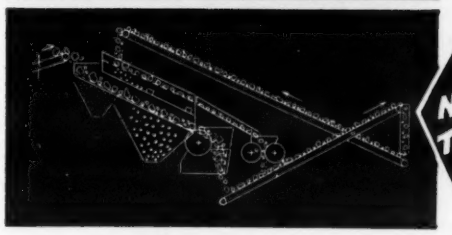
The asphalt used on this job was purchased from the Standard Oil Co. of Kentucky and was shipped 90 miles in tank cars over the L & N railroad to a siding on the north side of Carlisle, about 2 miles from the beginning of the job. The contents of the tank car was heated by a Lookout vertical-type 20-hp coal-burning boiler located in a shed close to the siding at the State Department of Highways yard. The MC-1 was heated to 125 degrees and the MC-3 to 175 degrees F, and then pumped either into the distributor or into a 1,200-gallon supply tank mounted on an International truck which later transferred its contents to the pressure distributor at the job site. The distributor or supply tank truck, each of which held 1,200 gallons, was filled in about 5 minutes from the tank car, using a Littleford Model 30 pump with a capacity of 350 gallons per minute.

Seal Coat

With its blade set at an angle of 45 degrees, the Galion power grader then worked along half the road, spreading one of the side windrows of stone over the sheen of bituminous material. When half of the road was thus covered with stone, the bituminous material was applied to the remaining half in the same manner and the other windrow of stone was spread over it by the power grader. During all these operations traffic was maintained on the half of the road not being worked on. When leveled off, the stone from these two windrows made a cover of about 50 pounds to the square

(*Concluded on next page*)





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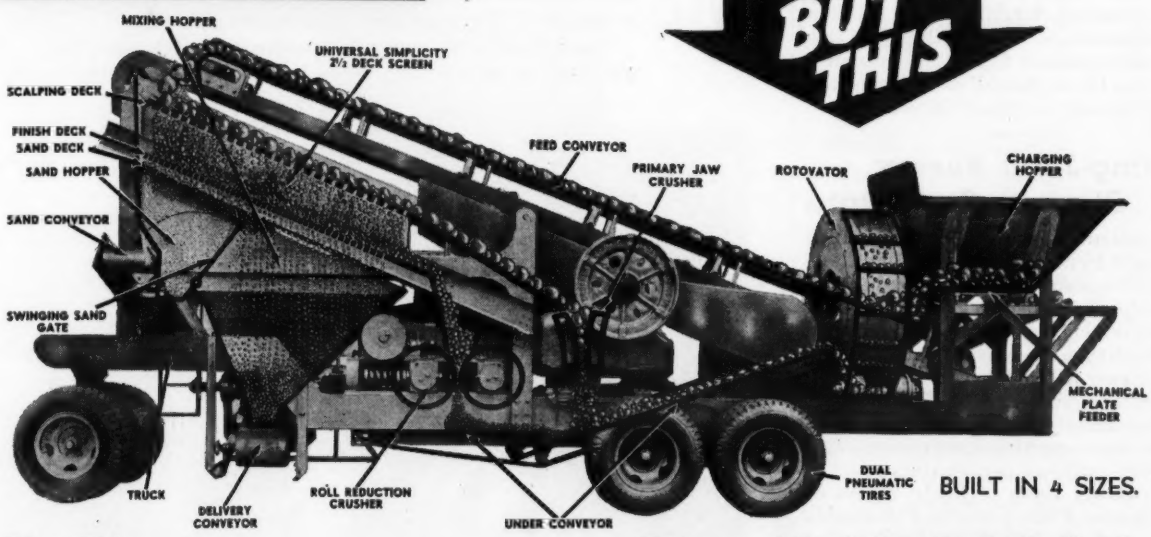
ENGINEERED TO THE Nth DEGREE!

Here's a Typical Example—

There are three principal methods of screening material in a gravel or rock crushing plant. Universal engineers studied them all and applied the Scalping Deck Method of screening to Universal portable and stationary plants.

BUT THIS



BUILT IN 4 SIZES.

Not This

Horizontal screening method

Material travels across screen too slowly, increasing h.p. requirements, screen wire wear and blending, lowering plant output.

Not This

Bottom deck feeding method

Pit run material all passes over finish deck, increasing wear on its small wire. All material retained by finish deck goes through jaw crusher, increasing jaw wear and decreasing output. Most of the product of the jaw crusher goes to rolls, increasing roll shell wear and h.p. requirements. Plate between decks makes screen hard to balance, increases plant vibration.

Universal Scalping Deck Method

- Large oversize scalped to jaw crusher. No glutting with undersize. Result: More capacity, less jaw wear, less h.p. required.
- Rolls receive only material over finish (lower) deck—no large rocks or slabs. Result: Less roll shell wear and lower h.p. required.
- Heavy top (scalping) deck wire handles large rocks—protects finishing deck. Result: All of screening area utilized fully, longer screen wire life.
- Screen operates counterflow (uphill) against material. Result: Better gradation and higher capacity—screenable material not carried over to crushers.

The Scalping Deck Screening Method is only one of the many superior features of Universal's better engineered plants. Send for bulletins detailing other distinct features.

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ASPHALT PLANTS · SPREADEROLLERS

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THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Traffic-Bound Road Is Surface-Treated

(*Continued from preceding page*)

yard. Any thin spots were corrected by sending a truck loaded with stone down the center of the road while two men shoveled off the material at the places requiring it. The power grader then shaped the entire surface of the road, leaving a crown of from 3 to 4 inches.

The surface was then sealed, half width at a time, with 0.35 gallon of MC-3 to the square yard, which was covered with 25 pounds of ½-inch-size stone chips to the square yard. Buckeye and Burch 9-foot spreader boxes, attached to the back of the four Ford dump trucks, were used in distributing the chips. A 10-ton 3-wheel roller keyed the stone firmly into the bitumen, after which the road was ready for traffic.

The stone was purchased from the Central Rock Co. at Lexington, Ky., and shipped in hopper-bottom cars 37 miles over the L & N railroad to the siding at Carlisle, where it was unloaded by belt conveyor directly into the trucks which hauled it to the job.

Personnel

A crew of about 14 under Maintenance Project Engineer F. C. Spurrier completed this reconstruction at the rate of about a mile of complete operations for the full width in a 10-hour day. The maintenance force was divided as follows: 2 on the power broom, 2 on the distributor, 1 on the bituminous supply tank-truck, an asphalt pump operator, 4 truck drivers, and 4 laborers. The Kentucky Department of Highways is headed by J. Stephen Watkins, Commissioner, with Thomas H. Cutler as State Highway Engineer. The Division of Maintenance, which directed this surface-treatment type of reconstruction, has H. D. Metcalf as Director and H. H. Palmer, Assistant Director.

Paving-Joint Survey Presents State Data

A nationwide survey of state practices and trends in expansion-joint layout and design, contraction joints, center strips, joint-sealing compounds, and curing methods was completed recently by the Keystone Asphalt Products Co. Transverse joints are used in one form or another, according to the highway specifications, in forty-one states. Some of the states specifying expansion joints for road building permit the use of as many as six types of joints, others as few as one. Fibre joints lead in acceptance, with twenty-three states using them. Cork, which may be used by eighteen states, is second. Various types of wood may be used for joints in fourteen states, asphalt joints in eleven, sponge rubber in nine, and cork and rubber in four. Cotton-seed, hull-mix, premolded filter, and poured joints are used occasionally.

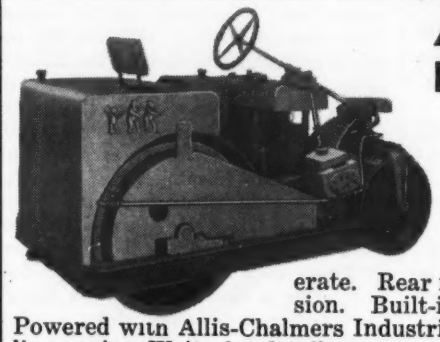
The thickness standards for concrete slabs range from 6 to 10 inches in the nation's highway system, the survey reveals. Distances between transverse joints vary from 30 to 600 feet, the most popular slab lengths being 120 and 90 feet. The joints are generally ½, ¾, or 1 inch thick, and are set from ⅛ to 2 inches below the pavement surface. Flush setting is done in two states, one using fiber and the other using poured joints.

Dummy contraction joints are reported in use by forty-one states. In this class, poured joints predominate, thirty states using this form. Premolded asphalt, mastic board, the machine ribbon type, and metal joints are also used. The thickness range for dummy joints is from 1/16 to ½ inch. Their depth generally approximates one-third of the slab thickness, though some states favor one-fourth depth. Spacings of 15, 20, and 30 feet comprise over 75 per cent of those given. The ratio of dummy-joint separations to the slab length ranges from one-sixth to one-third, as a general rule.

Center strips are used in practically all the reporting states. Tongue-and-groove joints are used in twenty-four states, dummy type in twenty, and butt in seven. Two states pour their center strips, while others use the machine ribbon system, the V-shaped key, and deformed metal joints. For a joint-sealing compound, thirty-two of the states report the use of poured asphalt and ten of rubber asphalt.

Of the eight different concrete-curing methods listed in the questionnaire, thirty states use four or more. Curing by cotton mats, used in thirty-two states, leads the parade. Membrane compounds, burlap, and paper rank a close second, each getting thirty-one choices. Wet earth may be used for curing by twenty-seven states, ponding by nineteen, and straw by a like number. Six mention the use of calcium chloride in curing.

The foregoing summary has been culled from a statistical report of the survey as published by the Keystone Asphalt Co. Readers may obtain copies of the report by writing to Keystone at Dept. 114, 43 East Ohio St, Chicago, Ill., and mentioning CONTRACTORS AND ENGINEERS MONTHLY



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Why You Need B-G Finishers For Large-Area Surfacing

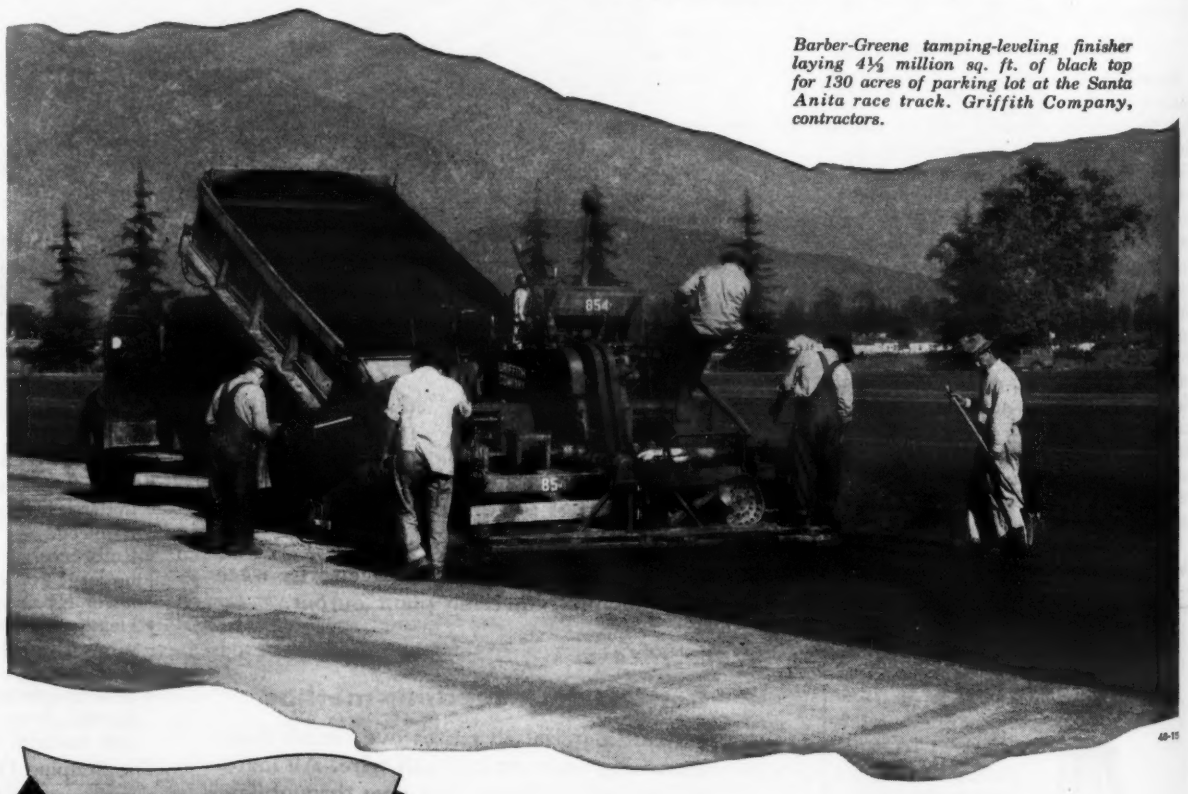
• An important requirement for large area surfacing—such as airport runways, super highways, parking lots, playgrounds, etc.—is that there be *no ridges or breaks in the entire surface area*. With so many of these jobs coming up now and in the near future, B-G Finishers are even more important to you.

These Tamping-Leveling finishers match the joints evenly—they compact and tamp each succeeding strip firmly in place against the previous one.

Because of this even compaction across the full width of the mat (including the joint) you get a ridge-free continuous surface area. There is the same density across the joint that there is in the rest of the strip.

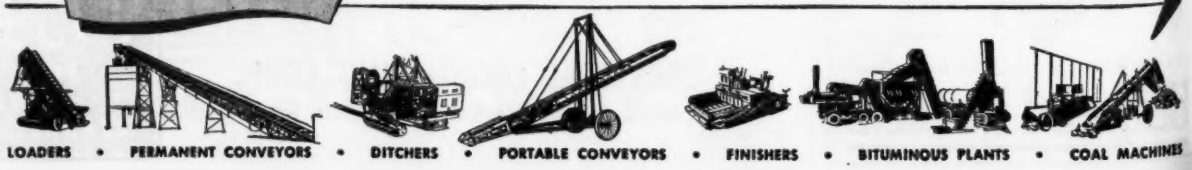
The B-G Tamping-Leveler finisher will lay any mix, hot or cold, loosely graded or sheet asphalt—and up to 6 inches thick. Also, it gives you a mat of uniform density and a smooth level surface over an irregular sub-base.

Your Barber-Greene representative has catalogs on Barber-Greene asphalt equipment and data on its performance on jobs like yours. Barber-Greene Company, Aurora, Illinois.



Barber-Greene tamping-leveling finisher laying 4⅓ million sq. ft. of black top for 130 acres of parking lot at the Santa Anita race track. Griffith Company, contractors.

B-G Barber-Greene CONSTANT FLOW EQUIPMENT



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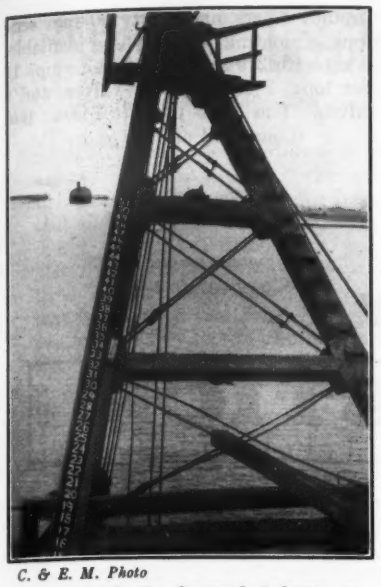


C. & E. M. Photo

Seen through the forward A-frame on the San Diego is the narrow channel connecting two turning basins at Corpus Christi. The 1,900,000-cubic-yard contract for deepening this waterway was awarded to Standard Dredging by the Galveston District Office of the U. S. Engineers.

Pipe-Line Dredge Deepens Waterway

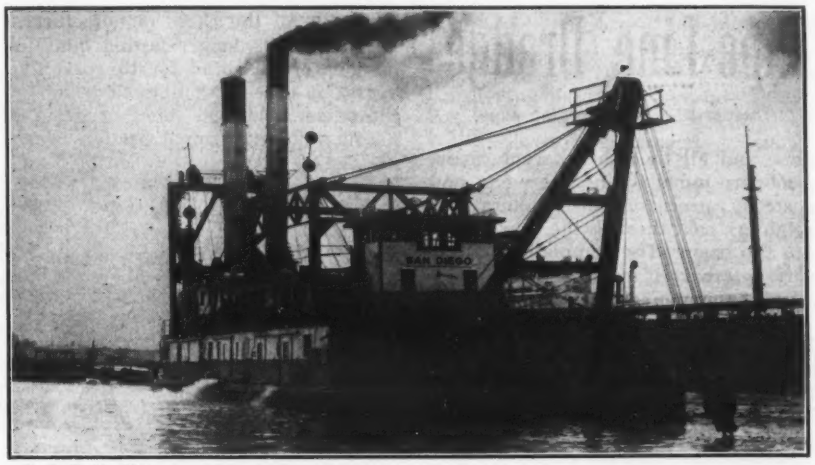
The Venerable San Diego Of Standard Dredging Corp. Enlarges Turning Basins and Industrial Canal

✦ EVER since the time of the Civil War, certain interests have tried to dig and maintain sheltered ship channels from the Gulf of Mexico to ports inland along the Gulf Coast. In 1946, the maintenance of such channels to project depth poses a problem which has no altogether satisfactory solution. Many reaches of these ship channels, varying from 200 to 400 feet in width, lie in open bay waters unprotected from wind and swells. When the "northers" come to the Gulf Coast, the results often wash solid material into the bottom of these channels, making it necessary to re-dredge parts when proper depths are no longer available for the tankers and commercial freighters which use the Gulf ports. The maintenance problem is further complicated by the employment of deeper-draft vessels developed during the war, making it necessary to enlarge the ship channels to project depths greater than those of pre-war days.

Enlargement Contract

Such an enlargement job, involving about 1,900,000 cubic yards of new dredging, was recently let by the Galveston District Office of the U. S. Engineer Department to the Standard Dredging Corp. of New York, at a low-bid unit price of $0.0891 per cubic yard, placement measure. The job is located at Corpus Christi, Texas, at the head end of the Corpus Christi to Port Aransas Waterway. It extends from the lower end of the main turning basin in Corpus Christi harbor to the upper end of the Avery Point turning basin, and involves the deepening of two turning basins 1,000 feet wide, with a widening and deepening of the present connecting canal.

Project depth for this waterway system is 34 feet below mean low tide, but in order to reduce the frequency of maintenance dredging the U. S. Engineers have authorized dredging to minus 36, with an additional 2 feet of allowable overdepth. At the time the job was visited, a series of soundings had netted about 37 feet below low water.



C. & E. M. Photo

The San Diego, owned by the Standard Dredging Corp., works to deepen turning basins and canal at Corpus Christi, Texas, as part of the U. S. E. D. channel-maintenance program.

The job, which is 12,400 feet long, is located for the most part in the heart of Corpus Christi's industrial district. Refineries, a synthetic-rubber plant, factories, storage warehouses, oil loading

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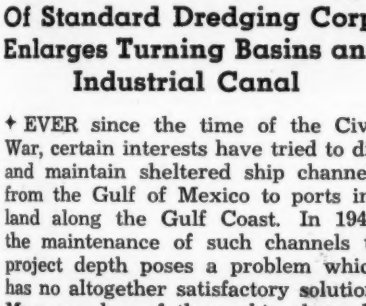

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The Biggest Little Hoists in the world for use where power is not practical, available, or sufficient.

2-Ton "Lightweight"	75 ft.	¼"
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With patent gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	$ 50
5-Ton 4 & 24 to 1	110 lb.	75
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CLEVELAND DR30 WAGON DRILLS are unsurpassed in maneuverability. They drill at any angle and in any direction —flat holes from 4" to 8' above ground —also straight up or down. Feed travel is over 8', permitting 6-foot steel changes, and the machine handles depths to 25' or more. The DR30 has a double screw U-bar jack, a recoil device to hold drill to its work, an improved centralizer, and a forward leg point to steady the drill. All these features make the Cleveland DR30 the most popular wagon drill ever built. Ask for Bulletin 132.
CLEVELAND H10 SINKERS are favorites in the 45 lb. class. Easily held, these fast cutters have strong rotation, and blow the holes with unfailing certainty. Either wet or dry construction. "T" handle illustrated is standard; open spade handle also available. All standard chuck sizes for collared drill steel, and plain or lugged shanks. Cradle mounting available for 24", 30" and 36" steel changes. The end-seating valve improves with use—no increase in air consumption as the drill grows older. Efficient lubrication of even hard-to-reach spots like flutes of the rifle bar, forward chuck bearing, etc. Bulletin 122 describes Cleveland Sinkers in detail. Ask for it.
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Pipe-Line Dredge

(*Continued from preceding page*)

piers, and all the other paraphernalia of modern industry line the banks, and a steady procession of tankers and freighters pass through the drawbridge into the basin. The completion of this work will make it much easier for these vessels to maneuver.

At the time the contract was awarded, Standard Dredging Corp. had also bid successfully on some maintenance dredging of the ship channel towards Port Aransas, so the hydraulic pipe-line dredges San Diego, of 27-inch discharge capacity, and the Miami, of similar size, were brought in. The San Diego had been idle for many months, and while she was being readied for digging, the Miami partially dug two cuts from the outer end of the seaward turning basin before she turned and proceeded on the other project.

Dredged material, composed of sand, silt, oyster shells, and blue clay in equal proportions, was earmarked by the U. S. Engineers for disposal along the northerly side of the shoreline for the protection of the industrial district from heavy seas and swells resulting from hurricanes.

The Dredge San Diego

The San Diego, one of Standard's oldest dredges, was built in San Diego, Calif., about 1911. She has a wooden hull 150 feet x 42.5 feet x 13 feet deep. Her upper deck houses a control room, galley, and living quarters for 30 crew members, while the lower deck is entirely given over to engine room and deck machinery.

She is a steam-powered dredge, having three boilers totaling 9,500 square feet of heating surface and ample capacity to operate the main functions through a 2,500-hp main steam turbine, a 400-hp cutter turbine, and a 200-hp reciprocating steam engine for the bow swing hoists. She has a 90-foot ladder, and can dig 50 feet below the water surface. The digging spud is 33 inches in diameter, 64 feet long, and weighs 17 tons. The walking spud is only half that heavy, and 30 inches in diameter. The San Diego is using a Type LD-7 clay cutter, turning about 38 rpm.

Her swing lines had been attached to 4-ton anchors up to the time the job was visited, but the near proximity of the beach to the narrow connecting channel had Captain J. H. Ayers, in charge of the work for Standard, hurrying back and forth to get a steel outrigger made for his anchor barge, so the anchors could be set up on a slope, if necessary by available floating derrick scows.

Swing and spud cables are of 6 x 19 Lang-lay preformed plow steel, with a hemp center. Swing cables particularly are subject to corrosion in the salt water, and severe bending stresses through sheaves and on the deck winch drums. Preformed rope, which is now made by all the cable manufacturers, has proved its longer-lasting qualities on jobs of this kind for the past five years. It takes less time to install at the outset, and lasts longer because it has no built-in torsional stresses. Swing lines were giving 550 hours of service on the average, and occasionally the port cable had lasted longer than that.

Floating and Shore Lines

At the time the San Diego moved in, Captain Ayers had thirty 50-foot sections of floating pontoon line available, along with 279 sections of shore pipe 16 feet long, 2 elbows, 2 Y-valves, and 4 valves. The first pipe line was laid

(*Concluded on next page*)

● Gross Weight
● Dipper Capacity

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● First Cost
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Pipe-Line Dredge

(Continued from preceding page)

parallel to the shore towards a shore connection about a third of the way up the turning basin. The shore line was laid through a tank farm near a refinery, and initial disposal of dredged material was made through about 5,000 linear feet of line. This has been the longest used in the job. The general average is 1,500 feet of shore line, with 1,000 feet of floating line. The material is lifted from 12 to 16 feet above the water surface.

Since the San Diego is not equipped with a gyro-compass, the sides of the cut are flagged as well as the center line. In narow cuts, as in the connecting channel between the turning basins, the passage of vessels is a problem and a nuisance. When a vessel passes in the 200-foot connecting channel, it is necessary for a tug to move the dredge over to the side, re-spotting the machine again after the freighter goes by. In the turning basin, her pipe line is parted by the pipe-line crew. Mobile Pulley & Machine Works pipe-line joints with rubber gaskets are used exclusively on the floating portion of the discharge pipe. Shore sections have slip joints, and are handled by a crew of six men.

Perhaps the most common thing about a dredging job, yet one least likely to be noticed, is the shore pipe gang on a dump ground. Except for maintaining a general elevation here, no elaborate dressing is necessary on this job. But the delicate balance which three men maintain on a piece of pipe weighing slightly over ½ ton as they manhandle it with bare hands is something to watch. The section rolls to the edge, is swung around still balanced on a timber, and a hand hoist slides the section ever so surely into place. There is no screaming; no waving of arms and cursing; no bouncing and denting and jolting of slip joints by machinery much too powerful for that use. This is one place where hand labor is the equal of machinery; it is artistry with a capital "A", administered on the daylight shift by W. Shirley, who has rolled pipe along the Gulf Coast since 1929.

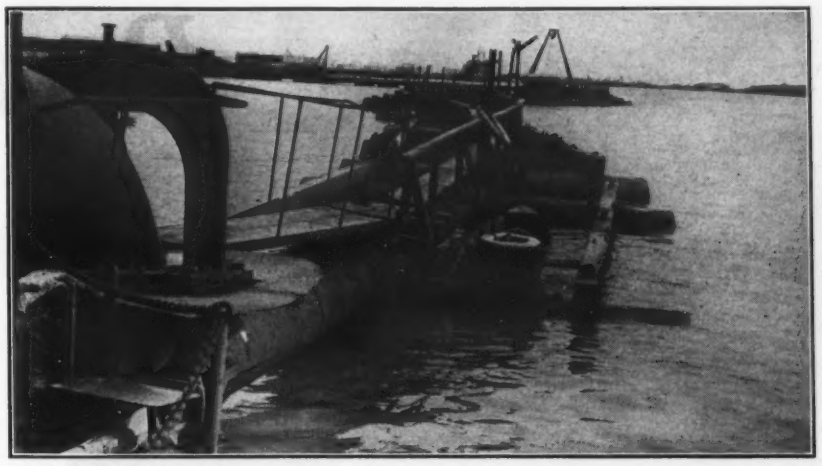
Progress and Personnel

The material digs comparatively easily. An average of 6 feet of bank has been removed, but in sections about 9 feet was dredged out. Production output has ranged from 500 to 2,500 cubic yards per operation hour, with 1,800 a fair average.

On account of routine delays, coupled with the breaking in of a new crew on the venerable old dredge which had been idle for months, effective digging time was approximately 55 per cent when the job was half finished. However, some of the most difficult dredging, and the longest pipe lines, had been encountered in this early work, and there was every reason to hope the last half of the job might see an improvement in digging time.

None of the unusually hard gypsum deposit which has recently appeared in dredging the 21-mile section from Corpus Christi to Port Aransas has been encountered on the San Diego's job. However, the Miami ran into a generous deposit of this material about 18 miles out of Corpus Christi. The presence of this extremely difficult-digging material, which colors discharge water chalky white, has aroused the interest of dredgemen all along the Gulf Coast region.

On the job, the supervisors, in addition to Captain Ayers for the contractor, included H. L. Sisson, Resident Engineer, and C. A. Ridenour, Assistant Resident Engineer. Colonel D. W. Griffith, U. S. Army, is in charge of the Galveston Engineer District, with Major W. W. Vance as his assistant in the post of Director of the Operations Division.



C. & E. M. Photo

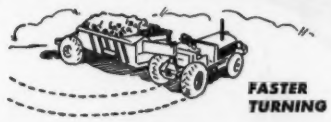
The floating line of the San Diego is composed of 50-foot sections and averages 1,000 feet in length.

Arthur Joins Littleford

The appointment of Robert S. Arthur as Chicago Branch Manager has been announced by Littleford Bros., Inc., Cincinnati, Ohio. He will handle the Littleford line of black-top road equipment from headquarters in the Builders Building, 228 No. La Salle Street.

Ease in Handling EUCLIDS Means Lower Cost Operation

BOTTOM-DUMP EUCLID ADVANTAGES



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• On this relocation of a Pennsylvania State Highway between Monaca and Aliquippa, Euclids moved approximately 900,000 cu. yds. of heavy clay and rock on long hauls which averaged 3 miles from shovel to dumping area.

In addition to 8 of their own Bottom-Dumps, S. J. Groves & Sons Co. of Minneapolis used 37 other Bottom-Dumps and 8 Rear-Dump EUCLIDS to haul a large part of the total excavation on this project.

Unusual maneuverability of Bottom-Dump EUCLIDS in the narrow working areas on this job was one of the important advantages of this equipment. Another was the rugged simplicity of the Euclids which enabled them to take this tough job in stride day in and day out.

These and other advantages have earned for Euclids their reputation for lower hauling costs. May we send you the proof?

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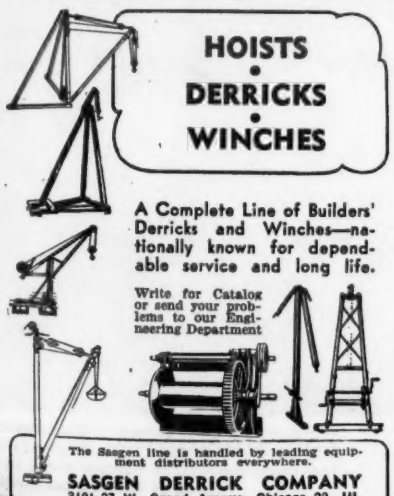

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Rock Taken F
For Leve

Granite Was Drilled and Hauled to Levee Whe Placed It for Grouted Co California Flood Con

(See article on page 2)

QUARRY. Lytle Creek canyon in San Bernardino County provided Winston-Utah-Vinnell, the contractors for part of the San Bernardino flood-control project, with ample material, taken from the base of the 1,000-foot-high slope on the left. The quarry produced 2,000 tons per 8-hour shift. In the foreground are the field office and shop.

DRILLING. After the blast, Ingersoll-Rand Jackhamers were used to drill shallow holes in the large chunks of rock for secondary blasting. A Sullivan 500-cfm compressor pumped air to a steel supply tank whence it was dispensed to the drillers through 500 feet of 2-inch line.

GRIZZLY. For the first three months operatio removed, the rock was s ted fro grizzly set up on the natural slant of the m inside. of the rock over railroad rails 6-inch

SPREADING. A crane with a 60-foot boom and an Owen 2-yard orange-peel grapple was found, after experimentation, to provide the best method of spreading rock on the levee slopes. The crane in the foreground is spreading blanket rock, while the unit in the background is placing derrick stone in the trench at the toe of the slope.

PERFORMANCE. Each crane plac m 400 For each linear f leve the same amount of derrick stone in the e requ thick at the top, increasing to es at

n From Quarry

Levee-Slope Blanket

Drilled and Blasted, Then Levee Where Grapples Grouted Cover on 10-Mile Flood Control Project

(C. & E. M. Photos)

TUNNELING. Coyote holes, 5 feet high x 3 feet wide, were drilled about 55 feet horizontally on 250-foot centers into the base of the hill, and then branched out at right angles into two 60-foot wings. Blasting from these wings was done with powder pockets spaced at 5-foot intervals between a clay and topsoil backfill, with an explosive ratio of ½ pound per ton.

...ree months operations, or until the overburden was all ...ock was separated from the dirt and quarry spalls by a ...nt of the mountainside. Heavy chains slowed the passage ...road rails on 6-inch centers in the grizzly.

HAULING. A Northwest 80-D 2½-yard shovel with an Amsco dipper loads derrick stone into one of the thirty trucks, from 14 to 35-ton capacity, for an average 8-mile haul. Paid on the ton-mile basis, the trucks were weighed en route to the levee project. Refuse and small material was used to build haul roads or temporary creek levees.

...crane place... ...m 400 to 500 tons of rock in a 9-hour shift. ...ach linear ... of levee, about 4 tons of blanket stone and ...e in the ... required. The rock blanket is 18 inches ...reasing to ... at the bottom of the slope.

GROUTING. After the rock was washed, sand-cement grout was poured by gravity from a fleet of truck-mixers, filling all the crevices in the slope blanket. Finished levee facing appears rough and durable, with sharp points of blue granite projecting through the grout. This work was part of a U. S. E. D. flood-control project.

Steep Access Road Is Built to Airport

Climbs 335 Feet in One Mile of Sidehill Cut; Spans Creek on Concrete And Steel Bridge

✦ TO reach the new Kanawha Airport at Charleston, W. Va., with speed and safety, the State Road Commission of West Virginia has built a mile-long access highway up the side of one of the mountains on top of which the airport is located (See C. & E. M., Dec., 1945, page 19). This road connects with a 16-foot concrete pavement, known as the Ruffner Hollow Road, at a point about half way between Charleston and the town of Bream. The total distance from the airport to the Charleston Post Office by this new route is only 4½ miles.

A contract for grading, draining, and placing a native-gravel base as a top for the access road was awarded to A. S. Wikstrom, a contractor from Bound Brook, N. J., who started work on this project August 1, 1945, and finished it early in 1946. His low bid was $202,634. The job was a typical example of winding sidehill road work, climbing 335 feet vertically in a distance of 5,542 feet. Some indication of the steepness of ascent can be gleaned from the center-line profile which shows a 7 per cent grade for 3,000 feet, with the final 1,200 feet being on an 8 per cent grade. The horizontal alignment is also sharp, with curves up to 18 degrees 14 minutes.

At the lower end, about 500 feet from where it leaves the concrete highway, the road crosses Elk Two-Mile Creek on a new 133-foot 10-inch concrete and steel bridge built under a separate contract by J. M. Francesca & Co. of Fayetteville, W. Va., at a cost of $22,550.58. This 3-span structure will be completed this spring.

Road Grading

The new roadway was constructed to a 34-foot width, consisting of a 22-foot surface of native-gravel base course, 8 inches thick, with a 7-foot shoulder on the downhill side and a 5-foot shoulder on the uphill side. The distance from the outside edge of the shoulder to the ditch is 3 feet. Fill slopes are 1½ on 1, while in the cuts the slopes are 1 on 1. The wearing-course gravel was compacted and shaped to a 1½-inch parabolic crown.

A force of between 40 and 50 men worked on the grading contract which started with the clearing of 25 acres of thick woods and brush, mostly by hand with axes and brush hooks. Two Caterpillar D6 tractors with dozers later pulled out the tree stumps and assisted in the clearing. The amount of excavation totaled 152,000 cubic yards, of which from 15 to 25 per cent was rock. Holes for blasting the rock were drilled by eight jackhammers of various makes powered by three 110-cfm air compressors, a Schramm, a Worthington, and an Ingersoll-Rand.

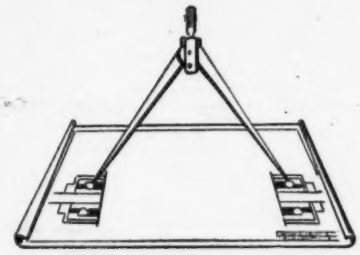
C. & E. M. Photo
Two of the fleet of LaPlant-Choate scrapers pulled by Caterpillar D8's work in a 55-foot cut on the new access road to the Kanawha Airport at Charleston, W. Va.

At the lower end of the job, about 30,000 yards of surplus earth was wasted in low areas along the creek, for although extra material was needed for fills near the top of the hill it obviously could not be transported up a mile of 7 per cent grade. Accordingly 110,000 yards of borrow was obtained from a large cut near the east end of the airport and moved downhill a maximum haul of 1,500 feet. On some of these downhill hauls at the beginning of the construction, the grades were as steep as 25 per cent, which lessened of course as the roadway gradually took shape. The excavation was planned to have loaded equipment move downhill or at least on the level, so that on the return uphill trip no load was carried.

In this sidehill excavation some of the slopes were 250 feet long with a natural slope of about 1 on 1, which in rock sections usually increased to ¾ on 1. Some of the fills that had to be made were from 80 to 100 feet high, from original ground to grade, while the cuts ran from 20 to 80 feet in depth. In order to stabilize the earth embankments along the side of the hills, benches sloping inwards were cut into the slopes, permitting the fill to be placed on top of them in horizontal layers, thereby reducing any tendency to slide.

(*Continued on next page*)

GOOD MAGNETOS
have Correctly-spaced Bearings



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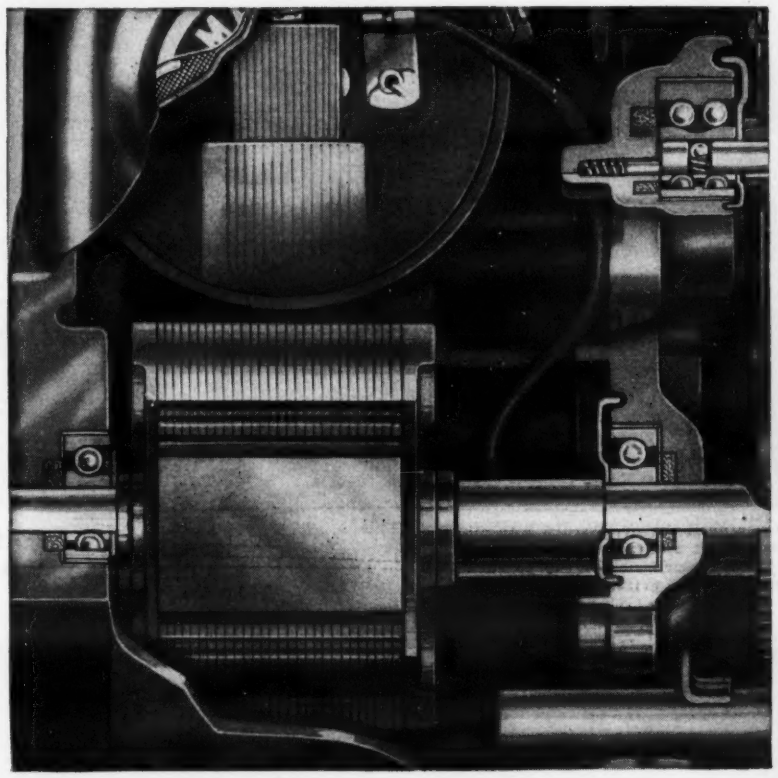

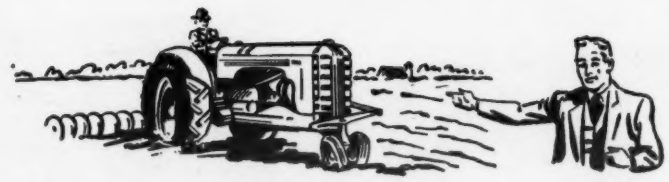

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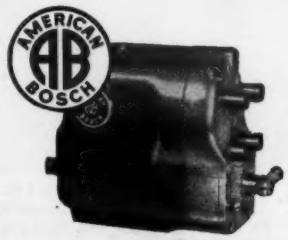

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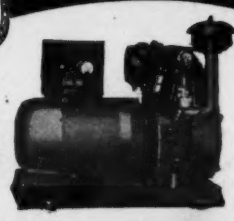

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STERLING MACHINERY CORPORATION
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Access Road

(*Continued from preceding page*)

Other benches were also cut into the hills above and below the new road in order to catch any material that may start sliding. These benches are 20 feet wide, and the one above the road was cut out about 50 feet below the top of the slope, while the bench below the road was excavated at about a 20-foot lower level.

Earth excavation started after the clearing was completed, with the ground being broken up by a LaPlant-Choate ripper pulled by a Caterpillar D8 tractor. Preliminary bench work in the rugged country was done by two other D8 tractors equipped with LaPlant-Choate dozer blades, and was followed either by power shovels or the fleet of scrapers and tractors which constituted the excavating and earth-moving equipment of the contractor. The shovels employed were a Lima 1¾-yard and two Koehring 604 1½-yard, while the scrapers used were six LaPlant-Choate 22-yard units pulled by D8 tractors.

The average haul with the scrapers was about 600 feet, and these were strung out along the line of the new road, enlarging the benches started by the tractor-dozers while moving the material from the cuts to the fills. They usually worked in two parallel benches, one above the other, taking dirt from the upper level and transferring it to the lower as they made a hairpin turn at each end of their run. By this process of loading and unloading over the entire length of the section under construction, the two working benches were gradually brought to the same level, thus forming the new roadway.

Borrow Pit

In this rugged country sufficient material was available at the airport site for the fills required at the upper end of the project. The shovels dug out this earth and loaded the scrapers which then moved down the hill, building up the fills as they went. LaPlant-Choate scrapers had been chosen for this job with the idea in mind that they would be shovel-loaded on part of their work, for which they are also adapted since the space above the bowl is clear of any parts that might interfere with the operation of the shovel. Three 17-yard bottom-dump Euclids assisted in the hauling from the borrow pit, making an average haul of 1,200 feet.

With this equipment an average of 6,000 yards of material, mostly a combination of shale and sandstone, was moved in the single 10-hour shift that was worked. The earth was placed in the embankments in 8-inch layers, while the rock was laid in 24 to 36-inch layers and mixed with the dirt as much as possible. Compaction was secured with two dual-drum sheepsfoot rollers pulled by tractors, which also shaped the material to the proper cross section with their dozer blades. The fills were given a final rolling by a 10-ton 3-wheel roller before the road was covered with the 8-inch base course of gravel taken from the creek near the lower end of the job.

Items and Personnel

At the foot of the hill in a rented shed the contractor set up a small shop for the maintenance of equipment used on the project, with the structural repairs being handled by two Lincoln electric welders. Alongside the shop were buried two 5,000-gallon tanks in which fuel oil was stored for the use of the diesel equipment. Two other smaller tanks, holding 500 gallons each, were mounted on skids and pulled each morning by tractors up to the section of the job where the equipment was working so that they could be refueled on the job each day. The contractor bought an Army scout car for use as a service truck in which he carried parts, small tools, etc.

H. J. Osborne was Superintendent on the A. S. Wikstrom contract which included the following major items:

Unclassified excavation	152,000 cu. yds.
Borrow excavation	110,000 cu. yds.
Native-gravel base course	3,800 cu. yds.
Corrugated-metal pipe, 24 and 30-inch	1,420 lin. ft.
Reinforced-concrete pipe, 15 to 24-inch	476 lin. ft.

Bridge Contract

The single bridge which had to be built for the new access road crosses Elk Two-Mile Creek, a shallow stream nearly dry in summer but which flashes high suddenly during a rain as the water runs off the surrounding hills. The concrete and steel structure has two end spans of 41 feet 4 inches and a central span of 51 feet 2 inches. The two abutments rest on twin concrete footings, 14 x 10 feet, built on rock to a depth of 2 feet and spaced 21 feet apart on centers. The two pier footings measure 34 x 6 feet and go down 4 feet to rock, while the piers themselves are 14 feet high. Ready-mixed concrete was used in the substructure, purchased from Pfaff & Smith Co. of Charleston.

Designed for a H15-S12 live loading, the superstructure consists of simple I-beam spans with the middle span made up of five 33-inch wide-flange 152-pound beams spaced 6 feet 9 inches on centers, with the end spans at the same spacing but of lighter construction, being 30-inch WF 116-pound beams. These beams are braced laterally with eight 18-inch 42.7-pound channels, placed across the diaphragm at each end and at the following intermediate foot marks: 20-20-17-16-17-20-20. On top of the steel a 6½-inch deck slab of reinforced concrete was laid, forming a 28-foot roadway with a 2½-foot sidewalk on each side.

H. O. Dye was Superintendent on the

(*Concluded on next page, Col. 3*)

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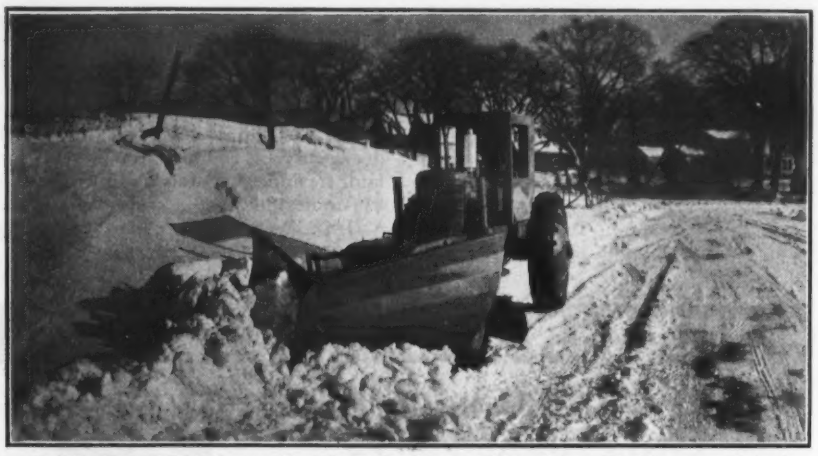


Upstate New York had more than its share of snow this winter. Working near Batavia is a Trojan V-plow powered by an International M tractor. This unit supplements the snow-clearing operations and, with the blade raised, can be used to bench the snow on the side bank.

Admixture Hardens, Waterproofs Concrete

For producing waterproof concrete and cement mixtures which will have increased early and ultimate strength, the Anti-Hydro Waterproofing Co. offers its admixture, Anti-Hydro. Added to the water at the mixer, the chemical solution is said to speed the hardening of the concrete while aiding in the curing. It is stated that Anti-Hydro-gaged concrete pavements can be opened for traffic in 24 hours.

The chemical is designed to prevent disintegration, to eliminate porosity, stop electrolitic action, and protect reinforcing steel from corrosion. Less mixing water is required, and a more workable and plastic mix is obtained, the manufacturer states.

Further details and literature on Anti-Hydro admixture can be secured by addressing the Anti-Hydro Waterproofing Co., 265 Badger Ave., Newark, N. J. Just mention this news item.

Access Road

(Continued from preceding page)

J. M. Francesca & Co. contract which included the following major items:

Excavation	690 cu. yds
Concrete	426 cu. yds.
Steel reinforcing bars	33,154 lbs.
Structural steel	112,000 lbs.

State Personnel

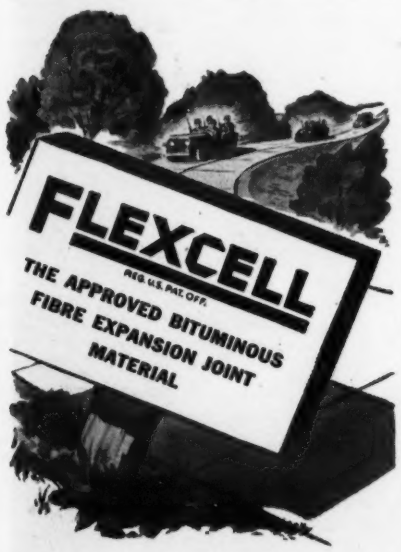
The new access road, which will handle traffic to and from the Kanawha Airport when it opens this summer, is a project of the State Road Commission of West Virginia headed by E. L. Worthington, Commissioner, with M. L. O'Neale as Chief Engineer. George W. McAlpin is State Construction Engineer, B. D. Johnson is Construction Engineer, and Frank Kennedy, Resident Engineer. J. H. Moore was State Inspector on the two contracts which totaled $225,184.58.

Serving very capably on this project as Assistant Inspector was Jorge Miño of Quito, Ecuador, a student of Universidad Central of that city. He was employed by the State Road Commission to receive on-the-job training in highway design and construction under an Inter-American Trade Scholarship granted him by the Office of Inter-American Affairs. After its completion, he will return to his native country.

New Dump-Body Hoists

Thirty different improvements over its pre-war models have been included in the design and construction of its arm-type hydraulic hoists, the Heil Co. reports. The firm recently issued two bulletins outlining the details and features of its Twin Arm hydraulic dump-body hoists for use on 1½-ton, 2½-ton, and heavy-duty trucks. The Twin Arm is said to raise the body to a 50-degree angle in 12 seconds.

Copies of the bulletins, BH-4550 for heavy-duty trucks, and BH-4533 for 1½ and 2½-ton models, can be secured on request. Just mention this notice when writing the Heil Co., Milwaukee 1, Wis.



Taking the Bumps Out of America's Highways!

● FLEXCELL—of the famous Celotex family—is the modern *approved* bituminous fibre expansion joint material for all highway and general concrete slab construction.

● Made of long, springy Celotex cane fibres, Flexcell compresses under pressure—springs back when the expansion pressure is removed. It never extrudes—keeps the highway surface smooth and serviceable.

● Flexcell is light, easy to handle. It can be set flush or it can be set below the slab surface with poured capping. Proved by years of service in American roads—with "never a bump in a million miles."

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THE CELOTEX CORPORATION

Dept. CEM-4, Chicago 3, Illinois

World's Largest Manufacturer of

BITUMINOUS FIBRE EXPANSION JOINT MATERIAL

Building a Highway.. Flight Strip..Airport?

Get all the Hot Material You Need— Fast at Low Cost with a Cleaver-Brooks Portable Booster

THE big opportunity to show how Cleaver-Brooks Portable Boosters make quick work of auxiliary airports, emergency landing fields and strips came when they were put to use in meeting vitally important "RUSH" war assignments.

Hundreds of these boosters were on the job heating the oils and bituminous materials as needed. Construction crews were not delayed . . . flight strips and airfields grew seemingly over night.

Cleaver-Brooks Boosters circulate and pump oils and bituminous materials while heating (approximately three times faster than is possible with steam) to a wide range of application temperatures as required on the job.

Bituminous boosters were pioneered by Cleaver-Brooks. They are in nation-wide use for airport and road construction and maintenance. They are without equal in speed and economy. Write for complete information.

CLEAVER-BROOKS COMPANY

333 East Keefe Avenue, Milwaukee 12, Wisconsin

Write On Your Business Letterhead . . . For the Bituminous — mix Calculator — a ready reference slide rule showing weight of mix needed in lbs. and tons in relation to width and depth of area to be covered.

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM-PLANTS

The new Series 415 hydraulic concrete-beam breaker applies a load up to 12,000 pounds for testing either in the laboratory or in the field.

Beam Breaker Tests Concrete Strength

A portable concrete-beam breaker suitable both for field testing and for laboratory experiments in the flexural strengths of concrete has been announced by the Rainhart Co., 602 W. 34th St., Austin 21, Texas. Designed by Charles C. Raines, the new unit, Series 415, embodies numerous improvements over earlier models.

Series 415 is a hydraulic concrete-beam breaker which is said to produce accurately a chart record of the complete loading cycle. It is designed to perform both the "third-point" and "center-point" flexural-strength tests within a 1 per cent overall accuracy in normal temperatures, in accordance with ASTM and other specifications.

Shockless hydraulic loads ranging up to 12,000 pounds are applied to an 18-inch span of either single or double break length concrete beam having a cross section up to 6-5/16 inches square through self-adjusting plates positioned on knife edges. Each record chart has a readily followed track so that semi-skilled personnel can apply uniform loads and satisfactorily perform complete tests.

Catalogs and test data relating to the Series 415 are obtainable on request from the manufacturer. Just mention this news item.

Progressive Peru Plans Highway Consolidation

First in a series of reports by U. S. Foreign Service Officers on highway conditions in the Latin American republics, a 6-page review "Highways of Peru" has been prepared by the Transportation Unit of the Bureau of Foreign & Domestic Commerce in Washington. Copies may be obtained from the Superintendent of Documents at 5 cents each.

The report reviews the background of Peru's transportation problems, and concludes that much of her future economy will depend on the further development of her highway system. In the last decade the nation has been in the forefront among Latin republics where highway improvement is concerned, ranking first in progress on the Pan American Highway. Peru's 2,250-mile section of this route is paved with asphalt along 1,100 miles, and surfaced with other materials along 990 miles more.

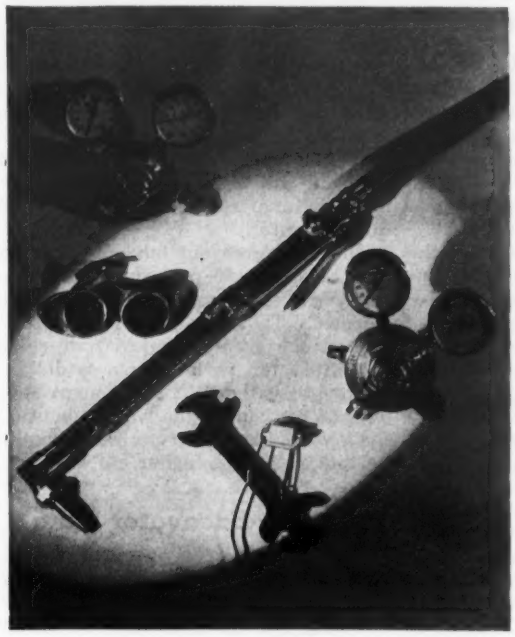
General information about the nation, her economy; topography; highway development, extent, expenditures, and administration; motor transportation; a description of the principal highways and penetration routes, with various statistical tables, comprise the report. A map shows the main north-south route along the coast, the Pan American Highway, together with auxiliary interior routes, the cross-links provided by the roads that penetrate the mountains, and projected interior roads.

Highway transport promises to become an increasingly important medium of communication, and the vigorous execution of the current highway program, which is designed best to serve the nation's economic and strategic needs, should be of great value to Peru's future welfare.

Portable Batching Bins

A versatile batcher plant for all types of concrete construction jobs is described and illustrated in a 12-page booklet of facts on the Heltzel Type One portable bins, recently published as Bulletin C-34. Plans and diagrams, sectional details, background information, and shipping advice are given, and typical installations and uses of Type One bins shown.

Copies can be secured on mention of this notice. Write the Heltzel Steel Form & Iron Co., Warren, Ohio.



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You cannot purchase a more dependable cutting torch—or one of wider range—than Victor.

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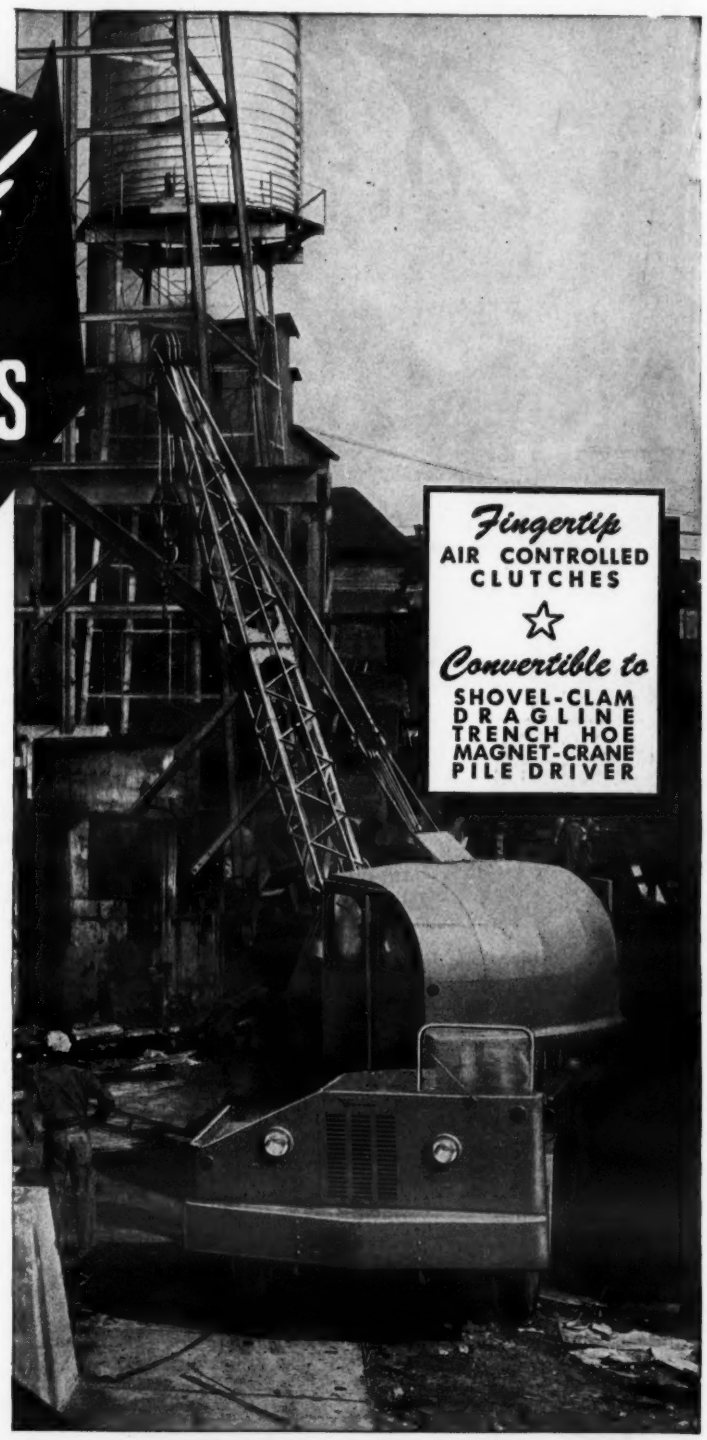

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ARE "TOPS" FOR JOBS LIKE THIS!

WHEN every minute counts, when limited working space would hamper ordinary equipment, put a MICHIGAN on the job. You'll find that its unexcelled operating speed, handling ease and truck mobility really pays off! And ten to one you'll also find that the job takes less time and costs far less than with other machines or methods.

Make a higher percentage of profit from construction and excavating jobs of all types with fully convertible MICHIGAN Air Controlled Mobile CRANES — available in 6 to 12 ton capacities.

Get The Full Facts
WRITE TODAY FOR BULLETIN CE-46

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POWER SHOVEL COMPANY
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New PRA Procedures For Contract Approval

Construction projects which involve Federal Aid can conceivably be approved by the Public Roads Administration, even though their costs exceed 1940 levels by more than 50 per cent, the PRA has decided in a clarification of its policies.

Under the new scheme, jobs which exceed 1940's level by 35 per cent or less will be approved by PRA field offices in accordance with regularly established procedures. Projects which reflect prices 35 to 50 per cent above 1940 can be concurred in by the Division offices of the Administration under the new ruling. However, such bids will be subject to critical analysis and review.

In all cases involving review, the District Engineer for the PRA must submit to the Division Engineer an analysis of the bids, together with his recommendation as to approval. The Division Engineer may then concur in the award, provided prices are not more than 50 per cent above 1940.

All projects whose bid prices exceed 1940 figures by more than 50 per cent must be forwarded to Washington. Here final determination will be made. Any bids appreciably in excess of 50 per cent will have to be supported by detailed analyses substantiating the quoted figures.

The PRA does not take the position that bids over 50 per cent are necessarily excessive and therefore will be rejected. Thus far, the PRA has approved the greater majority of cases submitted for review. On a dollar-volume basis the PRA has concurred in over 65 per cent of the work submitted for approval and on a project basis the percentage is even higher.

Tractor-Excavator Data

The wide range of operations possible with the versatile Traxcavator is illustrated in an 8-page bulletin, "Excavating with Traxcavators". These tractor shovels are built in three sizes for multi-purpose utility. Many of the varied uses of the machine are shown in the booklet. The Traxcavator buckets, in ½, ¾, 1, 2, or 2½-cubic-yard capacities, serve to dig, grade, load, carry, push, lift, cast, skim, strip, level, spread, clean up, backfill, and bulldoze materials.

Copies of the booklet, Form 507, may be secured on request, as well as specification leaflets covering individual models if the bucket size is given. Just mention this notice when writing the Trackson Co., Dept. CE-36, Milwaukee 1, Wis.

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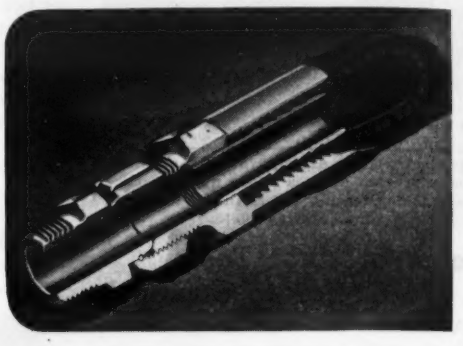
AVOID COSTLY DELAYS

Your hydraulically equipped scarifiers, graders, scrapers and discs will serve longer without maintenance when you use dependable EASTMAN high pressure hose assemblies.

With the EASTMAN "Pressed-On" Coupling, a patented gripping feature makes the bond of coupling to hose stronger than the hose itself. Leaf-proof 1-piece construction, for high pressure hydraulic control hose.



EASTMAN Adapter Unions are specially designed to prevent torsional strains or twists in high pressure wire-braided hose.

EASTMAN "Pressed-On" male and female iron pipe thread couplings furnished in brass for ½" to 1" I.D., 2-wire braid hose. In malleable iron, for ⅜" to 1" I.D., 2-wire braid hose and 1¼" and 1½" 3-wire braid hose.

If not readily available from your industrial distributor, write to —

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PIONEER MANUFACTURER OF HOSE COUPLINGS

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For your powered equipment, specify *proved power links* . . . Twin Disc Clutches and Hydraulic Drives with an established record of efficient operation, long work-life and easy, time-saving maintenance. These important profit-protecting characteristics of Twin Disc products are the result of 28 years' specialized experience in the design, construction and application of friction clutches and hydraulic drives . . . experience that means more minutes—and hours—of *profitable* operation from Twin Disc-equipped machines.

Take for example the operating records of earth moving and material handling equipment equipped with heavy-duty Twin Disc Friction Clutches, Power Take-offs and Reduction Gears. Records prove that the sure, easy engagement, single-point hand adjustment and simple lubrication procedure of these units—plus their demonstrated long life in the most severe service—mean fewer interruptions of the work cycle . . . more work done at lower cost! TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Top: Power Take-off. Below: Reduction Gear.

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● Every feature of Carver Pumps is designed to withstand the toughest operating conditions. Impellers are scientifically designed with web-reinforced vanes confining wear to one side. Renewable liners carry a cast lug protecting the scroll casing at the impeller cut-off where wear is greatest. Both parts are cast from special alloy and ground to close tolerance to keep performance high. When wear eventually occurs, their quick, low-cost replacement makes the pump as good as new.

THE CARVER PUMP CO.
Muscatine, Iowa

Maintaining Traffic On Highway Projects

Suggestions for Safety of Traveling Public and the Minimizing of Interference With Contractor's Work

+ THE maintenance of traffic on highway construction projects is a matter of importance for the consideration of highway department officials, George W. McAlpin, State Construction Engineer, West Virginia Road Commission, points out in the recently published Proceedings of the Southeastern Association of State Highway Officials.

The subject "should be given due thought and consideration if the traveling public, who are the taxpayers that provide the funds for highway improvement, are to be satisfied with the work we are doing, and if we are to avoid possible accidents and lawsuits", Mr. McAlpin stated.

In no phase of its activities does the highway department enjoy more intimate contact with those "who foot the bills"; hence construction can be turned to great public-relations advantage by the department. Not only can much goodwill accrue to the department from well organized publicity relative to the project, but also the public, though inconvenienced by the work, can be made to realize more fully the benefits they are receiving through the department's efforts.

Informing the Public

Good public relations can be achieved by fully advising the public of a projected piece of construction and the difficulties that will result from it. As a result, the traveler will be more tolerant and understanding when construction creates travel difficulties, and feelings will tend to become less ruffled on the road.

Informing the public should begin when the project is in the design and program stage. Releases telling of the proposed work, the benefits it will bring, and what provisions are to be made for traffic during it should be supplied to all news outlets in the affected area. Additional publicity should be secured when the contracts are awarded. Further details that should be announced at this time include the arrangements for detours or for carrying traffic through the construction, safety plans, etc.

Local automobile clubs, motor truck associations, bus lines, school authorities, and others with an interest in road travel should be advised in full of the plans for the project, and their cooperation enlisted to alleviate difficulties. Feature stories about the work should appear from time to time in the press, with stress being laid on the benefits to the public and the department's regret for the "temporary" inconvenience the work is causing. All road information, traffic conditions, and other necessary and helpful travel data should be gathered frequently, and made known to the public promptly.

Flagmen Meet the Public

In the forefront of the road builder's contact with the public is the flagman. It is in his power to create goodwill or unfavorable impressions as he handles traffic. The flagman's prime virtues must be courtesy and pleasantness, even in the face of the most trying circumstances. He should be well informed about the project and the surrounding country, so as to be able to supply motorists with facts concerning the project, and travel data.

The flagman should be equipped with all appliances necessary to aid him in carrying on his duty of protecting the public. Clean, easily identifiable red flags, lanterns, and other equipment should be on hand. Some states use small sentry houses to mark the end of the project and to serve as shelter for the flagman. Night duty increases the responsibility of the flagman, with its added travel hazards. He should be authorized to contact the person in charge of the project at any time for aid or advice in handling any situations that may arise.

On projects where alternating one-way traffic is maintained, a flag is sometimes given to the last motorist in line to be carried to the other end, where it is surrendered and returned with the stream of traffic going in the opposite direction. If a wire ring about 12 to 16 inches in diameter, with a red cloth attached, is used instead of a flag staff, it is easier for the motorist to grasp, and easier for the flagman to handle.

Detours

Many highway systems have parallel roads which may be used for diverting traffic off the stretch being worked upon. When a detour is used, the contractor is relieved of much worry and is able to carry on his work unhindered. The selection of detours should not be left to chance, but should be planned carefully well in advance of construction. Due consideration should be given the nature of the traffic flow along the interrupted route. The capacities of the alternate roads to carry the added load and to cope with the traffic problems that will arise should also be studied.

The erection of barriers at the end of

(*Continued on next page*)

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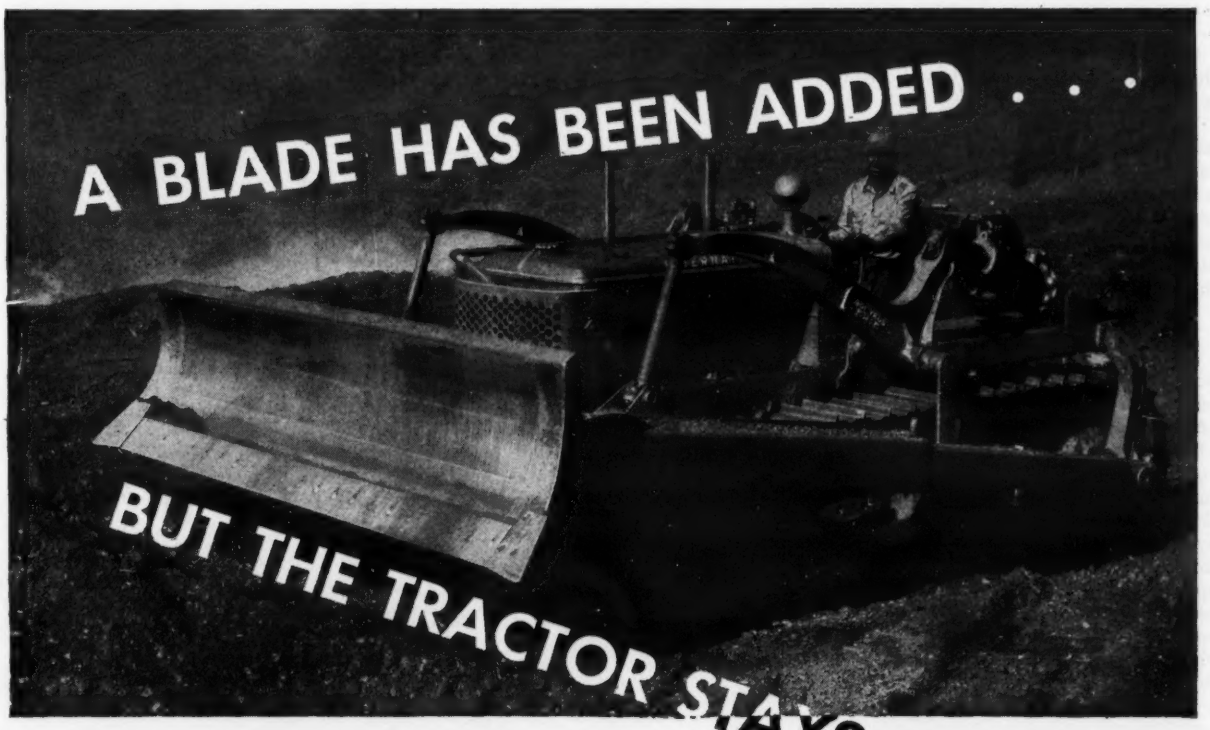

When a Bucyrus-Erie Bullgrader is mounted on an International TracTracTor, the all-important center of gravity does not change appreciably. There is no radical "balance-upset" to cause loss of power, excessive wear, or loss of the efficiency originally built into the tractor. Weight is properly distributed to give you full advantage of tractor power. Maintenance is low because digging loads are applied at the places designed to take them. All the speed, stability, and maneuverability of the bare tractor are still yours .... No wonder a Bucyrus-Erie Bullgrader in action is a picture of smooth efficiency. The operator can handle it easily without nosing down, gouging, jerking, or stalling. It digs its blade in and sweeps through the cut with the fast action that turns out accurate grades and record outputs. Drive is smooth, easy on the tractor. The whole length of the

tracks bears on the ground at all times for full tractive effort. Maximum power is concentrated at the blade . . . Performance like that will economically solve plenty of dirt-moving problems for you. That's why it will pay you to get complete information on Bucyrus-Erie Bullgraders from your International TracTracTor Distributor.

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Maintaining Traffic On Highway Projects

(*Continued from preceding page*)

the construction area is in the hands of the contractor, but most highway departments arrange for the posting of the detours themselves. Signs should be placed on the original route some distance from the work, to inform the traveler of the detour. Large signs, giving directions and distances to the end of the detour and intermediate points, should be placed at the beginning of each alternate route. A large directional arrow with reflectors is also desirable.

Every effort should be made to give the motorist a sense of security while traveling the detour. Frequent markings of the route should be provided, and should be visible day and night. Special attention should be given to crossroads' directions. On lengthy detours, signs with directions and distances should be placed about midway to reassure the traveler.

To avoid confusion, all detour signs should be removed as soon as the work is completed.

There are times when it is more satisfactory to build a completely new road for detour purposes, before the main project is commenced. This is the exception to the rule, however, and is used only where traffic is very heavy and the work is to take considerable time.

Traffic Through Project

At times, when the construction is of no great length, it may be more practical to carry the traffic through the project. This applies also where there is no alternate route or where the suggested route would carry much of the traffic far from its ultimate destination. Under these circumstances, the contractor has very definite responsibilities to the public. These are usually defined in the specifications and reiterated in the plans. Generally it is his duty to provide reasonable facilities to maintain traffic and safeguard the traveler from accidents. Many states require the contractor to carry liability and property damage insurance.

The project engineer should not permit the road to be torn up until adequate arrangements for traffic passage or detour have been completed and all necessary signs, warnings, etc., placed. Property owners along the route should be informed in advance of the work. Ample exit should not be denied them for any great length of time.

Where the right-of-way is sufficient to permit a by-pass just outside the construction limits, such a route should be used only by the public, never by the contractor's equipment. This is both a safety measure, and a protection of the right-of-way from damage. The responsibilities of the workmen greatly increase where traffic continues along the construction, and constant watchfulness must be exercised to prevent accidents.

Where power shovels operate near the traffic lane, flagmen should be assigned to direct traffic. Care must be taken that the swing of the bucket or possible falling of its contents does not endanger passing vehicles. Watch should also be kept on trucks working in and near the traffic lane so that they do not hit the travelers in backing. Working trucks should not be allowed to "hog" the passage route.

Equipment should not be left adjacent to or on the traveled lane at night, unless it is totally unavoidable, in which case adequate lighting should be provided to forestall accidents. Night lighting is of the utmost importance to safety, for the motorist's vision is restricted by the range of his headlights, and a lane which is easily negotiated in daylight becomes a hazardous nightmare at night.

Maintaining traffic through bituminous projects presents distinct problems. There is no greater source of public complaints than the spotting of automobiles by tar or asphalt. Bitumen is both difficult and expensive to remove, and may mar the car's surface permanently. Most states make it a policy to surface only one-half the roadway with bitumen at a time.

While one lane is being surfaced with bituminous material, it is generally uneconomical to erect barricades to keep traffic off it. However, some contractors use one-man stone, fence posts, boards, branches of trees, or other barriers at intervals to discourage driving on it. Despite such precautions, some drivers manage to cut in and out on the newly laid surface in an attempt to pass other cars. To forestall this, a pilot car bearing the sign "Follow But Do Not Pass" can be used to lead the traffic.

Signs should be placed at the end of the section to inform the motorist of the bituminous surfacing. "Fresh oil" signs spotted through the area are excellent for slowing traffic when putting down paving of this type.

A definite hazard likely to occur in bituminous paving is the leaving of windrows of aggregate along the center line of the roadway, or piles of material dumped without leveling. Easily seen by day, these are a great danger at night. Where they are resorted to, warning lanterns or bomb torches should be placed at the ends and at intervals of less than 500 feet along long windrows, and on each separate pile in the roadway.

(*Concluded on next page*)

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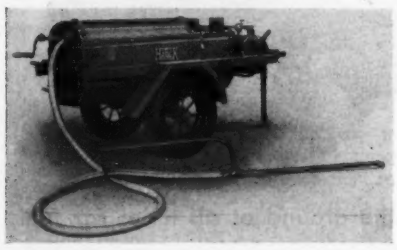

For tar and asphalt melting and spraying hot bitumen to patch roads and streets. Internal tube oil heating system produces "hot stuff" twice as fast as ordinary kettles and saves half the fuel. Tubes easy to remove and clean.

Capacities—55, 80, 115 and 165 gal., mounted on skids, or on steel wheels, solid rubber or pneumatic tires for hard use and easy trailing. Hand type rotary gear pump or gasoline engine driven pump for power spray, complete with hose and spray bar and tip attachable to any "Speed-Master" Kettle. Write for Catalog No. 661.

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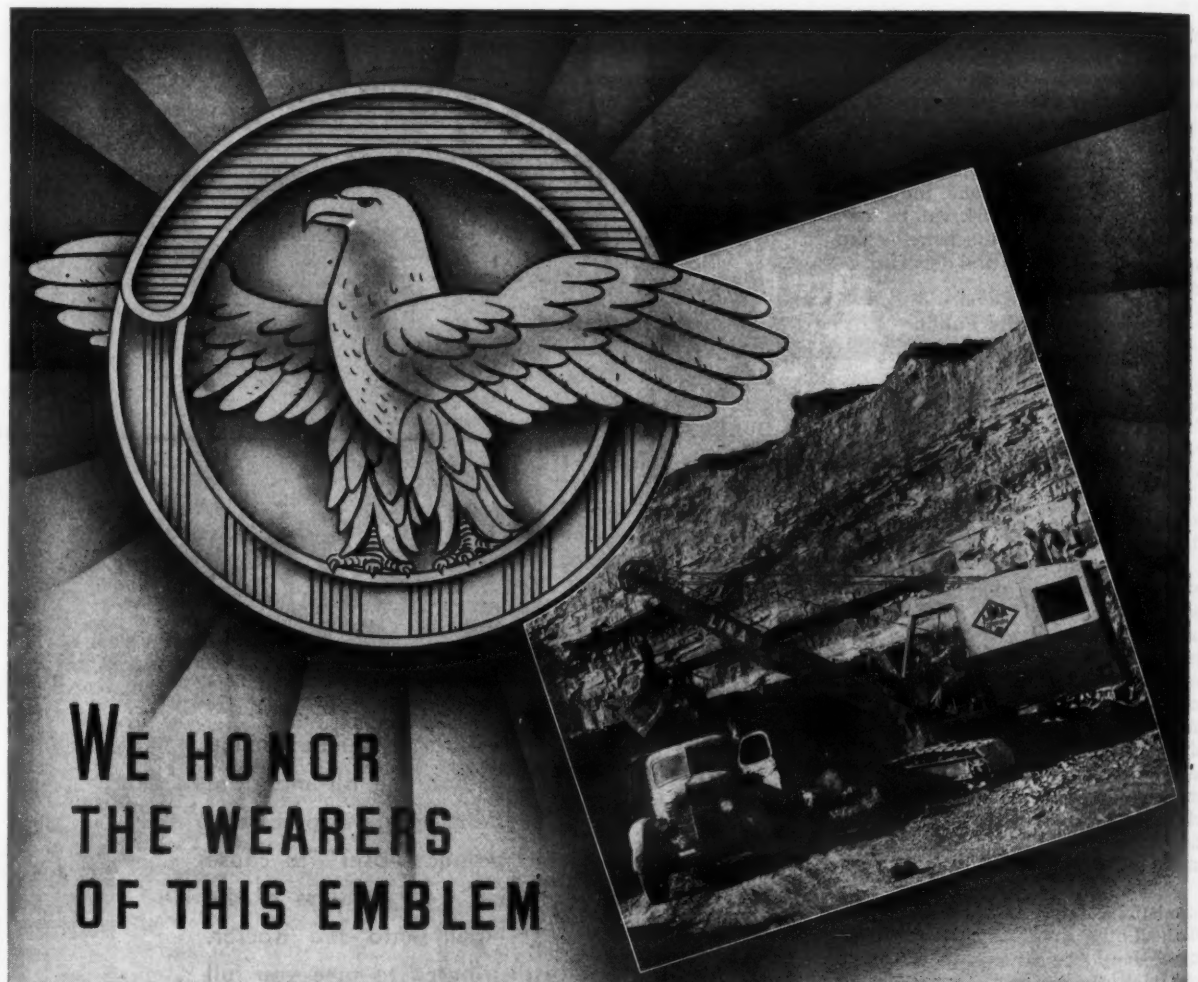

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SHOVELS - CRANES - DRAGLINES

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Maintaining Traffic On Highway Projects

(Continued from preceding page)

A bad practice often found on construction jobs is that of permitting the contractor's trucks to travel at high speed along the public's route. This should never be tolerated, nor should trucks be allowed to operate against one-way flow of traffic.

The Dust Problem

Dust is ever a big problem in maintaining traffic over construction projects. Created by the contractor's equipment or by the flow of traffic, it can be extremely annoying to adjacent property owners, to motorists, and to the workers. A dustless detour is not only good public relations, but it makes for equipment conservation, accident prevention, worker health, and many other benefits.

Dust conditions may be relieved in several ways. Where they are not overly severe, calcium chloride is quite effective. This becomes excessive in cost as the dust condition increases, however. An ordinary sprinkler wagon, which can be home-made, provides good results. Kept in continuous operation it should sprinkle only enough water to keep down the dust. Sprinkling may be provided for in a note on the plans to permit the contractor to bid for water by the gallon. Some states carry the responsibility for dust which is raised by the traveling public, holding the contractor responsible only for that which his own equipment kicks up.

Special Problems

Proper facilities should be afforded property owners along the project so that they have ingress and egress at all times, if possible. Should a new ditch cut off a driveway, a section of pipe or a bridge can be put in temporarily in order to allow passage. This should be maintained by the contractor and entered as a "maintenance of traffic" cost item.

Snow removal and the placing of abrasives during winter is another special problem. Detours should be kept passable for year-round traffic. Most states reserve the right to send their own maintenance crews onto construction projects where the contractor is maintaining traffic, and remove snow, place anti-skid or surfacing material, etc., at their own expense. This must be removed later by the contractor without any extra compensation.

The Traveler's View

In the mind of the traveler, the proper lighting of detours at night, the correct marking of the alternate route, and warning of all hazardous places rank of first importance. An all-weather detour that can be negotiated in safety is desired by everyone. Sufficient notice should be rendered the motorist by signs at the approaches and ends of the project and detour. The danger of falling rock from new cut slopes should be removed. Where one-way traffic is operated, long waits, especially at night, for the return of the flag from the other end of the project should be eliminated.

The highway and construction official should put himself in the shoes of the average motorist who knows little or nothing about detour practices and customs, other than that they are an inconvenience. By doing so, the road builder can realize the great value of those "extra little things" which, while they may not make the detour a "joy forever", certainly make it a little more pleasant for the traveler.

Goodyear Appointments

The selection of R. W. Fitzgerald, Detroit District Manager, to succeed the late E. L. Mefford as Manager of its Western Division has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Associated with the firm since 1919, he has served in Milwaukee, Chicago, and Omaha.

Mr. Fitzgerald has been succeeded in Detroit by M. C. McAlonan, Manager at Oklahoma City, a 20-year employee. Mr. McAlonan has, in turn, been succeeded by R. G. Miller, erstwhile Peoria District Manager. L. L. Passmore, Store Supervisor in the Chicago District, takes Mr. Miller's place at Peoria.

THE International TD-6 Diesel TracTracTor is a flexible, easily maneuvered crawler that's packed full of economical power to meet an unusually large number of power requirements.

Take its performance on the backfilling job illustrated. With a bullgrader of matched size, it backfills 700 to 800 feet of 6 to 8 ft. ditch each 10 hour day.

Positive, instant starting, combined with International construction, performance and long life, gives the TD-6 everything: fast action, modern appearance, balanced power and weight, and *full-Diesel* economy. Put it to work on the many jobs now coming up for attention and see how it takes on punishing work at new low cost.

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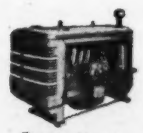
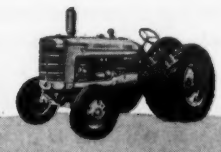

POWER UNITS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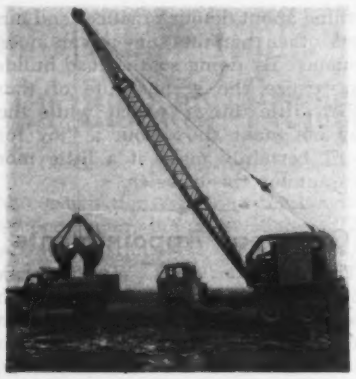

The Tu-Control model recently added to the Browning line is a two-engine combination of wagon and truck crane.

New Two-Engine Unit In Truck-Crane Line

The immediate transfer of traveling and steering functions from the driver's cab to the operator's is possible with the new control feature of the latest addition to the Browning line of truck cranes. Made by the Browning Crane & Shovel Co., an early producer of truck cranes and the pioneer of the self-propelled wagon crane, the new unit is a rubber-mounted two-engine wagon-truck-crane combination known as the Tu-Control.

When traveling to the job site, the Tu-Control's propelling action is controlled from the driver's cab. Upon its arrival, when crane activities are to commence, this control is shifted to the crane operator, so that he maintains full control over both travel and steer operations. The truck engine of the crane is shut off, and the use of hand and other signals is eliminated.

Readers of CONTRACTORS AND ENGINEERS MONTHLY who are now planning their future equipment set-ups may obtain more complete details from the Browning Crane & Shovel Co., East 163rd & Waterloo Road, Cleveland 10, Ohio. Just mention this notice.

Own a share in America. Buy Bonds!

General Manager Posts Filled at B. F. Goodrich

The appointment of J. E. Gulick and Chester E. Carroll as General Managers of two of the firm's divisions has been announced by the B. F. Goodrich Co., Akron, Ohio. Mr. Carroll heads the Associated Lines Tire and Accessory Sales Division, succeeding to the post held for 20 years by Harry E. Keller, who recently retired. Mr. Gulick, General Superintendent of the De-Icer and Fuel Cell Division, has assumed directorship of the Tire Manufacturing Division on the resignation of A. W. Phillips.

Cummer Opens N.Y. Office

A branch office has been opened at 101 Park Ave., New York 17, N. Y., by the F. D. Cummer & Son Co., Cleveland, Ohio, manufacturer of asphalt plants and driers. It will be under the management of M. B. Preeman, Secretary of the firm.

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HALF CENTURY of
MIXER LEADERSHIP

You can select a Smith Mixer or Smith-Mobile Truck Mixer with assurance that it is the finest machine of its kind available. For back of every Smith is a rich heritage of mixer building experience and satisfactory performance.

At the turn of the century, the late Mr. Thomas L. Smith invented the first duo-cone drum, tilting type, concrete mixer. It was an excellent machine, though only the forerunner of the famous Smith line of concrete mixers that has made history in the construction industry. Every year, new improvements and refinements were added, resulting in greater convenience, speed and efficiency.

Today, Smith is the acknowledged leader in the industry. And the demand for Smith mixers is increasing by leaps and bounds. There are still some sizes available for prompt shipment and deliveries of other models are being stepped up as fast as possible. So be sure to write for descriptive literature.

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NOZZLE TESTER

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Light in weight yet built for heavy-duty service, this portable, precision-built, low-cost tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors on bench or engine at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine. Ideal for testing hydraulic devices.

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Grading, Stone Base, And Paving at Airport

(*Continued from page 6*)

wooden bench with an 8-inch vise beside which stood a G-E Tungar battery charger. Other shop equipment included a Milford brake-riveting machine for replacing brake lining; a 32-inch manually operated press; and an Onan 1,000-watt electric-light plant which supplied electricity for lighting not only this building but the tractor shop and two trailers.

The tractor shop was also a 40 x 30-foot building with a wooden frame, and roof and sides made of asbestos board. Across the rear of this shop was a wooden work bench with compartments beneath for storing mechanics' tools; on top was a bench vise, and a Walker-Turner bench grinder. Other equipment included sets of Simplex 20-ton jacks on which the tractors were raised and then set on blocks, while their crawler treads were removed for repairs.

Two trailers also played a part in this maintenance set-up. One trailer body mounted on an International chassis was used as a storeroom for tractor parts which were kept in bins and compartments of various sizes around the walls. The other trailer was a compact machine shop containing a wooden work bench on which was mounted a Blue Point 6-inch grinder; on the other side of the trailer was an Atlas lathe with a 6-inch swing and a 3-foot bed. At the rear of the trailer was a 20 x 20-foot wooden building with asbestos-board sides in which welding was done when weather conditions did not permit outside work. To move heavy parts of equipment around in the yard a 1-ton single-drum Silent hoist with a 10-foot boom was found useful. It was mounted on a chassis with three rubber-tired wheels, operated from a 4-cylinder gas engine, and was also pressed into service for setting drainage pipe.

Runway Paving

A contract for putting down sub-base, stone base course, and a bituminous surface was awarded to the M. De Matteo Construction Co. on its low bid of $339,370.90, and work was started in June, 1945. The bituminous surfacing part of this contract was sublet to the Cumberland Contracting Co. and the paving finished in November, 1945.

Nine inches of slag from an old tin mill in Cumberland was compacted on the grade as sub-base material under all taxiways and for the final 500 feet at the ends of the runways, while only 6 inches was placed as a foundation for the remaining footage of the runways. In all cases the slag was laid 6 inches beyond the edges of the pavement in two courses and conformed to the following gradation:

Sieve Size	Per Cent Passing
2-inch	100
No. 40	10-80
No. 200	3-25

A Lorain 1½-yard shovel was moved to the tin mill and loaded the combination of slag, cinders, and pieces of fire-clay brick into ten hired trucks of various makes and sizes, with payment being made on the yard-haul basis. The trucks hauled the material 1¼ miles and end-dumped it on the grade where it was spread by an Allis-Chalmers Model K tractor-dozer, and rolled by a Buffalo-Springfield 20-ton tandem roller. Any material in the slag that would not crush under the roller, such as chunks of old brick or iron, or that was too large to pass the gradation specifications was picked out by hand and thrown to one side of the runway where it was later loaded by hand into trucks and dumped on the fills. After rolling, the sub-base was shaped by a

(*Continued on next page*)

C. & E. M. Photo

A slag sub-base was placed on the grade for the new runways and taxiways at the recently improved Cumberland, Md., Airport. Delivered by trucks, the slag was spread by an Allis-Chalmers tractor-dozer and graded by a Caterpillar power grader.

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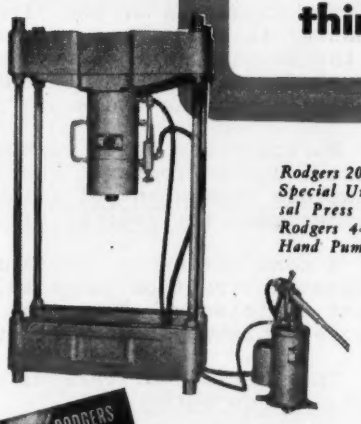
...an all-around press that does things the time-saving easy way



Rodgers 200 ton Special Universal Press with Rodgers 4-speed Hand Pump.

Send for this catalog giving specifications and other interesting information. Free, of course.

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Shop Presses · Crawler-Track Presses · Portable Presses · Power Pump Units

7415 Walker St., St. Louis Park, Minneapolis 16, Minn.

Grading, Stone Base, And Paving at Airport

(*Continued from preceding page*)

Caterpillar No. 10 power grader. A crew of nine men worked on the laying of the sub-base.

On top of the sub-base went a 9-inch layer of crushed stone with the following gradation, laid in two courses on both runways and taxiways:

Sieve Size	Per Cent Passing
3-inch	100
2½-inch	90-100
1½-inch	25-60
¾-inch	0-10

Some of the stone for the base course was purchased from the Security plant of the North American Cement Co. at Hagerstown, Md., and shipped 70 miles in hopper-bottom cars over the Western Maryland railroad to Cumberland. The rest of the stone came from the Cumberland Cement & Supply Co. at Corriganville, Md., and was shipped 10 miles to Cumberland via the same railroad and in the same type of cars. The stone from both places was unloaded at a siding of the Cumberland Cement & Supply Co. into a hopper beneath which trucks were loaded by gravity. Six of the contractor's 10-ton Sterling trucks were used to haul the stone 4 miles to the airport, where it was stockpiled for later use, at which time the Lorain 1½-yard shovel was moved from the slag pile to load stone into smaller 1½-ton trucks.

The stone was spread loose to a depth of 5 inches either through a Jaeger stone spreader, or dumped on the sub-base and spread by two Caterpillar power graders. The course was well rolled and compacted by the 20-ton roller and by two Buffalo-Springfield 10-ton 3-wheel rollers, and then given a choke course of stone screenings to fill all the voids in the base. The screenings, purchased from the same companies which supplied the stone, met the following gradation:

Sieve Size	Per Cent Passing
⅜-inch	100
No. 4	85-100
No. 100	5-25

The screenings were put on through the tail-gates of the 1½-ton trucks, and were pushed into the voids by the rollers which pulled drag brooms at the rear to help work in the screenings. A second course followed in the same manner as the lower course, resulting in a 9-inch compacted depth of stone and screenings. Excess screenings were then swept away by a Hough power broom and blower pulled by a truck, thus presenting a clean surface for the asphalt prime coat.

Bituminous Surface

All the bituminous work was done by the Cumberland Contracting Co. which operates a commercial asphalt plant in Cumberland, and purchased its asphalt from the Standard Oil Co. of New Jersey at Baltimore; its stone from the Standard Limestone Co. at Martinsburg, W. Va.; and its sand from the Arundel Co. in Baltimore.

The prime coat was MC-1 asphalt applied at the rate of 0.3 gallon to the square yard by a Littleford 1,250-gallon distributor, mounted on a GMC truck, using a 16-foot spray bar. The operator at the rear of the distributor communicated instructions to the driver by a buzzer system, two buzzes meaning to go ahead and a single buzz meaning to back up. The prime was allowed to dry at least two days before any hot-mix was laid.

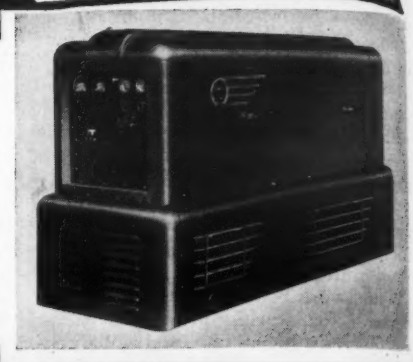
In some locations the existing bituminous surface had to be removed, such as at the intersection of runways 3 and 2, in order to avoid a bump. In that area a special saw-tooth blade on a Caterpillar tractor was used to take off about an inch of paving around the center of the intersection, while more was removed from the outer perimeter where the depth of new paving was increased.

Where new asphaltic concrete was laid on old, a light fog or tack coat of RC-2 asphalt was first applied at the rate of 0.2 gallon to the square yard. Then the new pavement was laid in a single course 2 inches thick on the runways, and 2½ inches thick on the taxiways and for the final 200 feet of runways where the planes stand and warm up. The 4-mile haul from the asphalt plant to the airport was made by six trucks, each holding 6 tons of black-top which was laid in 10-foot lanes by a Barber-Greene finisher.

Paving started at the center lane and proceeded towards the sides to avoid the impounding of water along the edges of the strips in case of rain. A ⅝-inch crown was put in the center lane of the pavement by adjusting the two gates on the finisher, but the remaining lanes had a straight crown of 1 per cent slope to the sides. The edges of the runways were kept straight and true by wooden forms, 2 x 6-inch boards, 18 feet long, fastened to the ground with wooden stakes. A smooth surface on the pavement was obtained by marking grades for each 10-foot lane

(*Concluded on next page*)

WINPOWER ELECTRIC PLANTS



Generators that Can "Take It", on Toughest Jobs

Look at these features! Light, compact, portable—with *oversize* parts to assure high output, low-cost, on even the hardest day-and-night continuous jobs. Oversize oiling systems for longer life. Air and water cooled gas engine models in all sizes from 350 to 35,000 watts, A.C. and D.C. Write for catalogue today.

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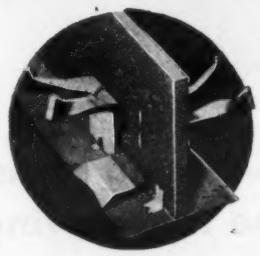
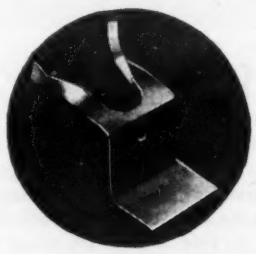
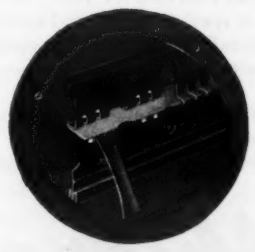
THE 1946 *Are Ready*







Paving Contractors and Engineers
United States of America

Gentlemen:

The soundness of the "Translode" principle of load transfer in concrete permanent construction has been proved by the satisfactory performance of millions of feet of Translode joint installed under varied climatic and regional conditions during the past fifteen years.

During these years we have been working constantly to improve design features and lower the cost. The 1946 Translode expansion joint is ready. It is priced lower, but designed for greater efficiency.

A combination of the Translode expansion joint and the Keylode contraction joint will provide the 1946 ultimate in joint efficiency. This combination will protect the life of concrete highways, airport runways and city streets.

They merit your careful consideration. Circulars available on both.

Very truly yours,

HIGHWAY STEEL PRODUCTS COMPANY

President

Grading, Stone Base, And Paving at Airport

(Continued from preceding page)

every 25 feet in both directions over the entire runway. Rolling was done first by an Austin-Western 10-ton 3-wheel roller, followed by a Buffalo-Springfield 8-ton tandem roller.

Two Littleford kerosene heaters were part of the equipment, one being used to keep clean the rakes and shovels of the asphalt workers, and the other to heat the asphaltic cement which was painted on the side of a lane next to which a fresh 10-foot strip was to be placed. The average rate of production was 400 feet of 10-foot pavement 2 inches thick in 1½ hours. The greatest output of the plant was 250 tons in a 10-hour day.

The plant-mix, which was laid at a temperature between 270 and 300 degrees F, consisted of crusher-run limestone from ¾-inch down to fines, sand, and asphaltic cement with a penetration from 120 to 150. A 1-ton batch with the weights proportioned by the sizes of aggregate in three different bins was as follows:

Bin No. 1 (No. 4 to No. 200)	1,300 lbs.
Bin No. 2 (½-inch to No. 10)	200 lbs.
Bin No. 3 (¾-inch to No. 4)	370 lbs.
Asphaltic cement	130 lbs.
Total	2,000 lbs.

A typical job mix for the day was proportioned according to the following gradation:

Sieve Size	Per Cent Passing
¾-inch	100
½-inch	94.9
⅜-inch	85.1
No. 4	74.7
No. 10	56.4
No. 40	24.7
No. 80	10.9
No. 200	6.3
Bitumen	6.6

As the pavement was completed, a surface treatment followed, consisting of a tack coat of RC-2 asphalt applied at the rate of 0.2 gallon to the square yard, and covered with stone aggregate distributed from the tail-gates of trucks at the rate of 12 pounds to the square yard. The stone was graded as follows:

Sieve Size	Per Cent Passing
¼-inch	100
No. 4	70-100
No. 10	0-70
No. 40	0-5

The cover stone was rolled first by a Wobble Wheel pneumatic-tire roller, followed by the 8-ton tandem roller. The surface was then carefully broomed by a specially built drag broom attached by cable to a truck. The drag was made with a wooden frame 12 feet long x 10 feet wide with diagonal bracing, and had fiber brooms, 6 inches high x 6 inches wide, fastened to its cross and diagonal members. Any stone that remained after this treatment was removed by the power broom and blower, and the surface was given a final cleaning with hand brooms. Unlike road construction, where the aggregate from a surface treatment is generally permitted to remain on the surface and work into the pavement, all stone had to be cleaned from the runways so that it would not be blown against the plane fabric or into motors.

Quantities and Personnel

The grading and drainage contract of the Grandview Co. was supervised by its Engineer M. J. Brown, and included the following major items:

Unclassified excavation	920,000 cu. yds.
Concrete pipe, 8 to 24-inch	13,900 lin. ft.
Transite pipe, 16-inch	400 lin. ft.

The major items on the paving contract were:

5-inch sub-base for warming-up apron	3,380 sq. yds.
9-inch concrete apron	3,350 sq. yds.
6-inch sub-base material (runways)	52,630 sq. yds.
9-inch sub-base material (taxiways)	55,850 sq. yds.
9-inch stone base course	26,600 cu. yds.
Bituminous prime coat	30,200 gals.
Bituminous tack coat	1,100 gals.
Asphaltic-concrete hot-mix pavement	12,500 tons
Seal-coat bituminous material	29,000 gals.
Cover aggregate	660 tons

M. De Matteo was Superintendent for the operations of his company in its part of the paving work and employed a force of 25 men. The Cumberland Contracting Co. had a paving crew of 12 men under Superintendent D. Williamson. Harry Simberg was Resident Engineer, while W. E. Kline is Regional Administrator, and R. M. Brown is Chief, Airways Engineering Branch, of the Civil Aeronautics Administration.

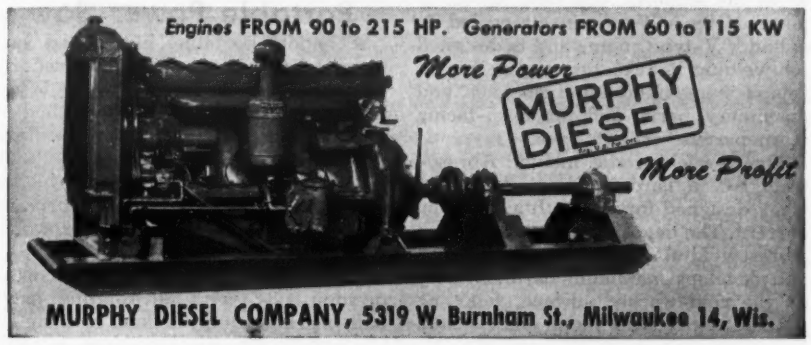
Victor Advances Two

The election of E. A. Daniels and E. O. Williams as Vice Presidents has been announced by the Victor Equipment Co., San Francisco, manufacturer of welding and cutting equipment. They have been associated with the firm 18 and 16 years, respectively. "Ernie" Daniels, who was formerly General Sales Manager, now assumes complete charge of sales. "Ed" Williams, Los Angeles District Manager, becomes Manager of the Southern California District in his new post.

Versatile-Crane Folder

The varied range of operation possible with the truck-mounted Wayne crane is illustrated in a new 16-page brochure. Complying with state highway regulations on dimensions and axle loads, the Wayne crane travels under its own power from job to job at speeds up to 15 mph. Its uses as a trench hoe, shovel, crane, dragline, and clamshell are shown in the booklet, as are the various features of its construction and operation. One power plant serves all functions. Specification charts are given for the various adaptations.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can procure copies of this bulletin, Form 405, direct from the manufacturer, the American Steel Dredge Co., Fort Wayne 1, Ind. Just mention this review.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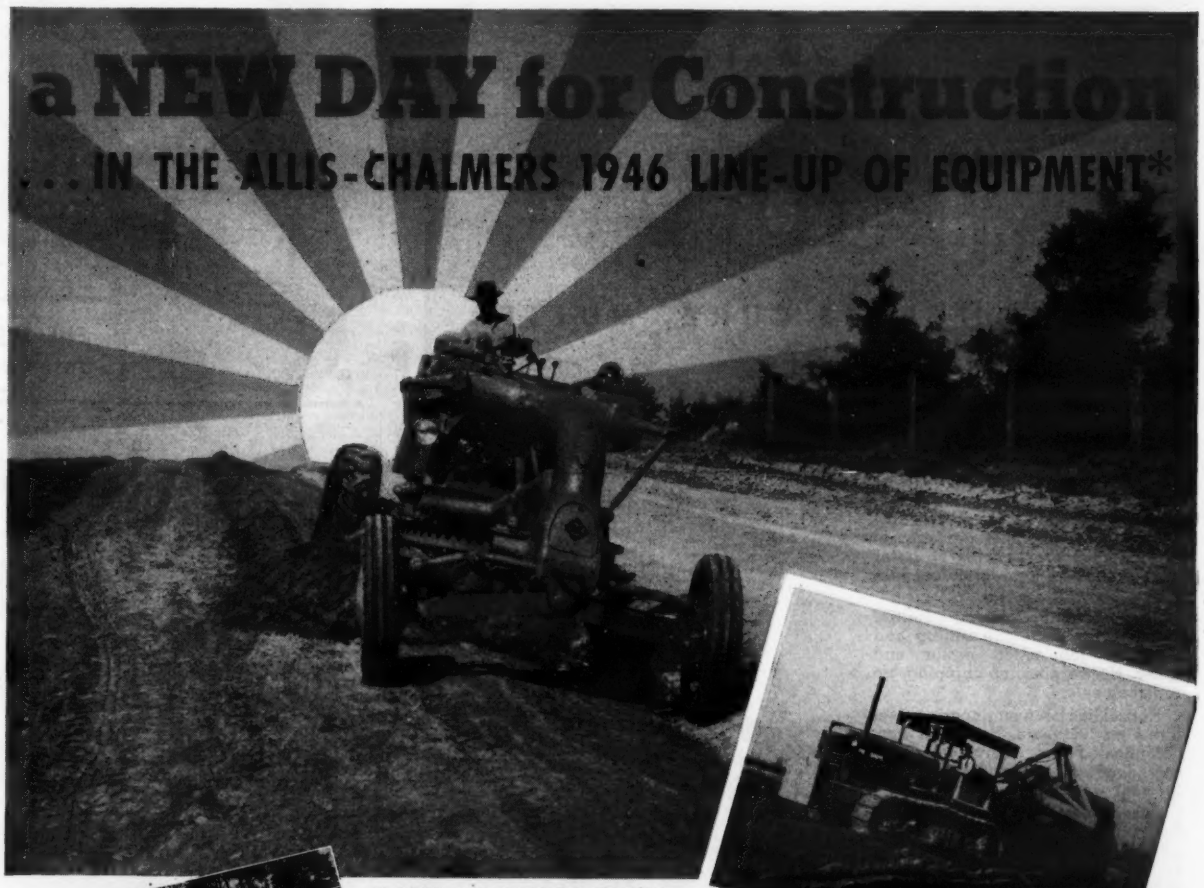
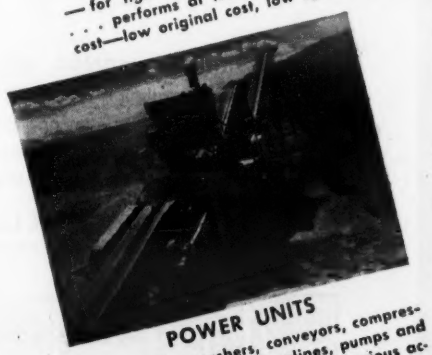


MODEL W-SPEED PATROL — for light construction and maintenance . . . performs at fraction of usual grading cost—low original cost, low operating cost.

MODEL A-D MOTOR GRADER — 75 Diesel h.p. engine . . . more traction, more clearance . . . a full range of blade positions for handling complete grading — slopes, ditches, surface.

2-CYCLE DIESEL TRACTORS — now a choice of four models, ranging from 60 to 132 drawbar h.p. — HD-7, HD-10, HD-14, HD-14C (Torque Converter Tractor) — with matched allied equipment — cable and hydraulic bulldozers and scrapers . . . snow plows, winches, sheepfoot rollers, rippers.



POWER UNITS — for driving crushers, conveyors, compressors, screens, shovels, draglines, pumps and other equipment. Available with various accessories to fit the application. 5 sizes. Choice of fuels.

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Modern in performance!
A new high in productivity . .
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MODEL I-B WHEEL TRACTOR — the ideal, economical unit for countless pulling and pushing jobs—especially popular for sweeping streets, blacktop, snow.

* MORE MACHINES ARE TO BE ADDED . . *Watch for Announcements!*

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

New Electric Welder And Arc Electrodes

A new portable gasoline-driven electric welder and new developments in shielded arc electrodes have been announced by the Lincoln Electric Co., Cleveland 1, Ohio. Known as the Shield-Arc Jr., the welder is in the 200-ampere class. Compactly built, it measures 24 x 48 x 30 inches and weighs 660 pounds. With a current range of from 40 to 250 amperes, this new welder is powered by a Wisconsin air-cooled 4-cylinder V-type engine and is designed for welding light or heavy-gage metal, repair work, fabrication of tools and machinery parts, and for hard-facing worn parts.

The new electrodes include Abrasoweld AC, a hard-facing electrode for steel, designed for use with alternating current. The deposit which results from Abrasoweld AC is corrosion-resistant, and develops maximum hardness only on the cold-worked surface, retaining a cushion of softer metal underneath. Manganweld A, suspended during the war, has been improved and is again available, Lincoln announces. This electrode is generally recommended for flat work.

More complete details on these products, the new Shield-Arc Jr. welder, the new Abrasoweld AC electrode, and the improved Manganweld A, may be secured direct from the manufacturer. Just mention this notice.

Portable Power Saw

A handy, portable, high-speed saw for shop use has been announced by Wyzenbeek & Staff as part of its Wyco line. The new unit can be attached to any ¼-inch drill, electric, air, or flexible-shaft. It will chuck in drill chuck or collet. Ordinary hack-saw blades and standard ¼-inch-shank machine files are used for working metals, wood, or plastics.

The new saw has a light-weight magnesium body, with all rotating parts ball-bearing-equipped and running in oil. True sawing is said to be assured by a new square plunger which has a take-up for wear. The design and construction make the unit easy to use in difficult spots, it is claimed.

A detailed illustration of the saw and full information concerning it can be secured by addressing Wyzenbeek & Staff, 836 W. Hubbard St., Chicago 22, Ill. Mention this news story.

New Post for K. F. Park

Kenneth F. Park, Sales Development Manager, has been appointed to the newly created post of Engineering Consultant on all matters pertaining to the earth-moving field, the Caterpillar Tractor Co., Peoria, Ill., has announced. Formerly with R. G. LeTourneau, Inc., Mr. Park joined Caterpillar in 1944.

First to feature Welded Steel Construction
WELLMAN
Williams Type BUCKETS

Bucket users know that welded steel construction means longer service at lower cost. Wellman originated this finer type of bucket construction! A type for every service: Multiple Rope, Power Arm, Dragline; Power Wheel. Special Service: ⅜ to 18½ yd. capacity.

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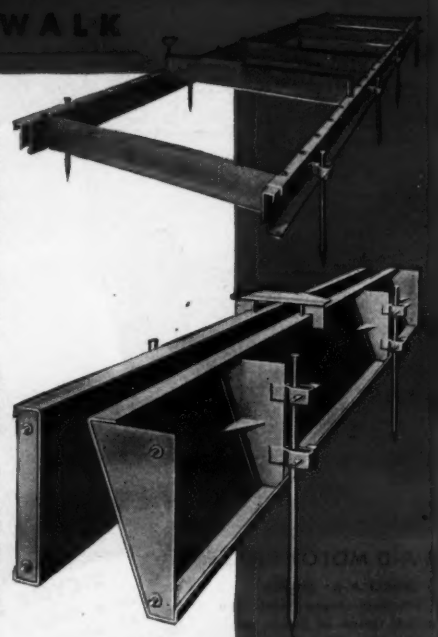

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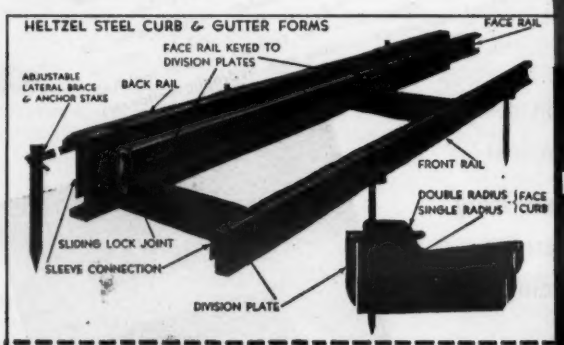

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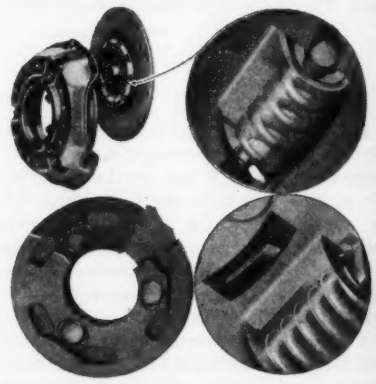

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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Contractor, Not Navy, Was Guard's Employer

A civilian guard employed at the site of construction work on a Navy air base in Tennessee was fatally injured when an entrance gate fell upon him while he and another employee of the contractor were attempting to get the gate rollers back in position on their track. The guard's widow brought a common-law suit for damages against the contractor on a theory that her husband had nothing to do with the construction work and was in reality an employee of the Navy, and that therefore the case was not governed by the Tennessee Workmen's Compensation Act. But the Supreme Court said that the suit was properly dismissed, that the decedent was an employee of the contractor within the exclusive compensatory provisions of the Act. (McDonald v. Dunn Construction Co., 185 S. W. 2d, 517.) The court concluded:

"It is manifest that the control, which in its contract with the defendants the Navy reserved over these civilian guards, was a control only for the purpose of seeing to it that the guards should be men of desirable character and reputation, and should continue as such during the period of their employment by the defendants on the Base. It was essential, of course, that the guards should be men of some discretion and at all costs sabotage and other subversive activities were to be avoided. Neither the language of the contract nor the action of the parties under it lends color to the theory that the Navy 'controlled' these employees of the defendants in the sense that the term is used in the law of master and servant.

"These guards were paid by the defendants and the defendants carried their social security and old age benefits."

When Right to Damages For Delays Is Waived

The right of the general contractor on a government dam project to offset liquidated damages against a subcontractor's compensation, on account of delayed performance, was lately considered by the United States Circuit Court of Appeals, Eighth Circuit, in the case of United States vs. John Kerns Construction Co., 140 Fed. 2d. 792. The court reversed a judgement that had been rendered by the United States District Court for the Eastern District of Arkansas in the same case (50 Fed. Supp. 692).

The gist of the higher court's decision is as follows:

A contractor or subcontractor is not liable for liquidated damages for failing to complete work by a specified time when prevented by the other party.

His agreement to complete the job by a certain date implies that he will be furnished with the necessary plans and specifications, including changes made at the instance of the owner, in time to permit performance by the agreed date.

Contrary to what was decided by the lower court, the subcontractor was not bound to seek an extension of time from the Government, through the general contractor, under the provisions of the general contract. The subcontract itself provided for extensions by agreement of the parties thereto. Although the parties ignored these provisions and mutually acted as if extension in favor of the subcontractor must be secured from the Government, the general contractor is in no position to complain because the subcontractor did not follow the proper procedure (apply to him for an extension under the subcontract) because the circumstances show that the general contractor waived any right to claim liquidated damages. It appears from the evidence that the general contractor induced the subcontractor to continue performance of the work after expiration of the time limit fixed by the subcontract, upon implied assurance that the general contractor would not make any claim on account of delayed performance. That constituted a waiver of the liquidated-damage clause.

Subcontractor Need Not Rescind Broken Contract

A contractor constructing bridge abutments and piers sublet the placing of reinforcement bars. While the subcontract was being performed, the prime contractor erroneously insisted that the subcontractor was chargeable with the cost of falsework, and so charged the latter on its books. After the work was completed, the subcontractor sued to collect on the contractor's bond. The contractor insisted that the subcontractor waived his rights by failing to rescind the subcontract on being informed that he was being improperly charged. Deciding the controversy in favor of the subcontractor, the United States Circuit Court of Appeals, Ninth Circuit, said:

"We assume, without deciding, that" the subcontractor "could have rescinded the subcontract. * * * However, it was not obliged to do so. It could, as it did, stand on the subcontract and, being at all times ready and able to perform, keep it alive for the benefit of both parties." (Union Paving Co., defendant-appellant, v. United States, for use of Soule Steel Co., plaintiff-appellee, 150 Fed. 2d, 390.)

Was Delay Fault of Owner?

A construction contract required the owner, a school district, to reimburse the contractor for loss resulting from the district's failure "to provide all labor and materials essential to the conduct of this work not included in this contract, in such manner as not to delay its progress". The contractor's men struck because the school district awarded other electrical work on the same project to an employer of non-union labor. Arbitrators decided that the district was liable to the contractor for loss resulting from the strike. But, on appeal, the Pennsylvania Supreme Court set aside the award of the arbitrators as being based upon a mistaken conception of law. (Navarro Corp. v. School District of Pittsburgh, 344 Pa. 429, 25 Atl. 808.)

The decision of the Supreme Court rests upon a conclusion that the electrical work was let to an employer of non-union labor as the lowest responsible bidder, as required by law. Said the court: "It is difficult to understand how defendant"—the school district—"could be held liable in damages, under the contract, for delay in the work caused by plaintiff's own striking employees. Certainly, it could only be if defendant forced those employees off the job. And even if this were true, as plaintiff argues, because of letting a contract to a non-union employer, the answer is immediate that defendant had no choice in that matter and

(*Concluded on next page*)

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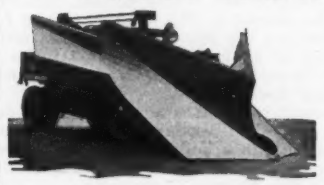

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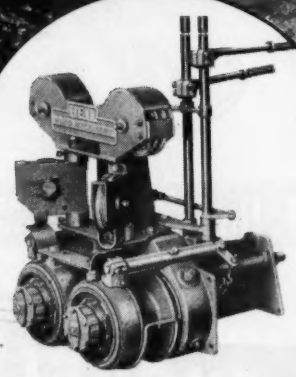

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Avoid Legal Pitfalls

(*Continued from preceding page*)

only did what it was required to do by law and its contract with the Federal authorities, to wit: let the contract to the lowest responsible bidder. * * * It cannot seriously be contended that the electrical contractor was not the lowest responsible bidder merely because he employed non-union labor."

Duties of Physician Employed by Contractor

A highway contractor's employee sustained a back injury while at work. The contractor engaged a physician to treat the injured man, but refused to pay the doctor's bill because he had not reported more fully concerning the patient's physical condition, and refused to deliver to the contractor, for examination by other physicians, X-ray negatives which he had taken while he was treating the employee.

The Michigan Supreme Court decided that the contractor had no valid defense against the bill—that there was no agreement as to what reports should be made by the physician, and therefore if he made all that were called for he discharged his duty in that respect. As to refusal to surrender the X-ray negatives, the court said that they belonged to the doctor, even though the contractor was charged with the cost of making them. X-rays are to be regarded as part of the physician's clinic records and he did all that he could have been legally compelled to do when he offered to permit other physicians selected by the employer to inspect the negatives in his clinic. (McGarry v. J. A. Mercier Co., 262 N. W. 296.)

Surety's Liability On Contractor's Bond

Whether a lessee of equipment used by a sewer contractor had a valid claim on the contractor's bond was the subject of debate before the Virginia Supreme Court of Appeals in the case of New Amsterdam Casualty Co. v. Moretrench Corp., 35 S. E. 2d, 74. The court upheld the right of the last-named company, the lessee, to hold the surety company liable for the rental value of equipment leased to the contractor, the value of such equipment as was missing and not returned, and the expense incurred by the lessee in furnishing a demonstrator to explain operation of the equipment.

The case turned upon the fact that the bond and the contract were so tied into each other by their respective provisions that the surety became bound to pay for everything that the contractor was bound to pay for. So, the provision in the bond binding the surety to pay for all *labor* and *material* furnished the contractor was enlarged by a clause in the contract requiring the contractor to pay also for *equipment* and for "services and facilities of every nature whatsoever necessary to complete and deliver the work".

Whose Loss When Gov't. Rulings Halt Contract?

For lack of ample appellate-court decisions on this question, a decision rendered by the Court of Common Pleas for Beaver County, Pa., is interesting. A township school district's architect forbade a contractor to proceed with a building contract which was under way when the WPB required an award of priorities before certain materials could be procured. The contractor sued for damages and the court refused to set aside a verdict of a jury in his favor. (Busse v. Center Township School District, 53 Pa. Dist. & County Rep. 479.)

The court said: "It is often difficult to determine whether responsibility for inability to proceed with a building contract because of interposition of the law falls upon the owner or the builder. [Editorial Note: Obviously the same is true of other construction contracts.] This is particularly true during wartime conditions such as now prevail when various governmental agencies have the right to issue summary orders which have the force of law. The trial judge in this case met the difficulty by ruling that so long as the prohibition against building was absolute, the responsibility for loss incident thereto was upon the defendant-owner; * * * but *when the only impediment to building was the necessity for obtaining priorities for material the responsibility was upon the plaintiff-builder* who conceivably had materials in stock." Because the owner's lawyers had not objected to the accuracy of the trial judge's instruction to the jury as to the law, the court refused to comment further upon the point.

The defendant-township contended that it was not bound by its architect's order stopping the work, but the court decided that the township had in effect ratified his action, which could be shown by circumstances, and did not require the evidence of minutes of the governing authorities of the township or other writings.

Controversial Contract Resolved Against Author

One of the A-B-C rules of law is that where a clause in a contract is doubtful, a court will interpret it according to the permissive meaning least favorable to the party who drew the agreement. So, where a sewer construction contract, worded at the instance of a city housing authority for which the sewer was constructed, read: "The contractor shall be responsible for the proper care of all work performed until completion and final acceptance", the Pennsylvania Superior Court decided that in determining whether the contractor was bound to guard against collapse of a section of the sewer, due to pressure of a bulldozer used by an independent contractor in filling the sewer trench, the quoted clause should be read most strongly against the housing authority. (Housing Authority, Pittsburgh, v. Sanctis Construction Co., 43 Atl. 2d, 581.) The contractor was exonerated from liability for the collapse of the sewer.

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WYCO features: Hardened spud vibrator head completely sealed—nose hardened alloy steel—cast steel rotor—2 Norma Hoffman roller bearings, 1 ball thrust bearing, for dependable rotor action in severest conditions—greatest amplitude of vibration for size of vibrator head—protected oil plug.

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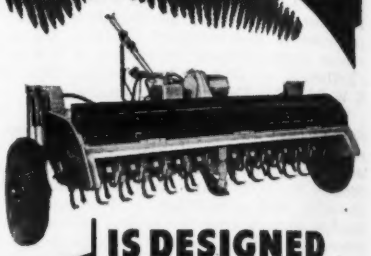

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The advantages of "fluid pressure" in the compaction of soils by means of the Wobble Wheel pneumatic-tire roller are the subject of a new bulletin issued by the Road Machinery Division of the Wm. Bros Boiler & Mfg. Co. The brochure shows the Wobble Wheel in action and explains the oscillation of the wheels to eliminate ridging. Compaction test results are given, as are drawings comparing solid and fluid pressures, and specification charts for Wobble Wheel Models 45W and 67W.

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The appointment of S. Kenneth Weiser as Assistant Sales Manager to aid W. P. Stratton, General Sales Manager and Advertising Manager, in building a distributor organization, has been announced by the Gladden Products Corp., Glendale, Calif. Mr. Stratton retains the post he held when the firm changed its name from Kinner Motors, Inc., recently. Mr. Weiser has been for three years the Service Manager of the older organization.

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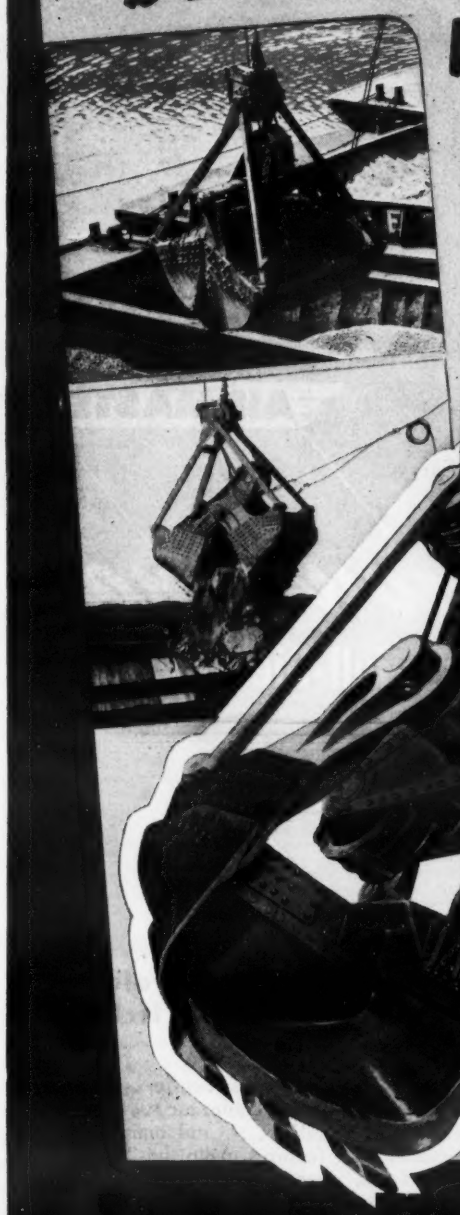

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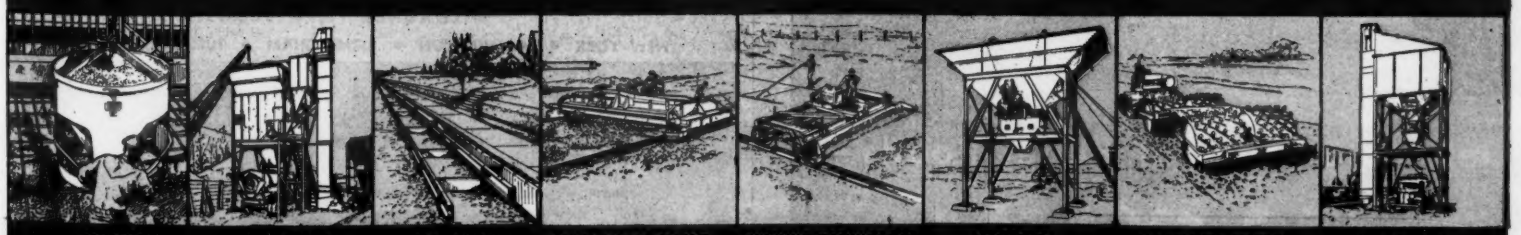

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Trestles and Bridge Span Swamp and River

(*Continued from page 1*)

of the river bottom and after the seal concrete was poured were then cut off at an elevation 9 inches above the top of the seal concrete.

The steel sheet piling served as forms for the 4-foot concrete seal which was poured by a concrete tremie lowered into the forms from the boom of the Northwest crane. Eight days after the seal was poured, the sheet-pile cofferdam was unwatered by a Jaeger 8-inch centrifugal pump, after which a 4-inch pump of the same type and make was kept operating so that the footings could be poured in the dry.

The land pier on the west bank was similarly constructed, with the concrete being delivered by trucks driving across the falsework.

Batching Plant

For the concreting, a batch plant was set up on the east bank of the river about 500 feet from the nearest pier. This consisted of a 20-yard Johnson bin divided into two equal compartments for the sand and gravel which were weighed on a Johnson beam scale. The aggregates were purchased from the Becker Sand & Gravel Co. at Cheraw, S. C., and shipped 50 miles in gondola cars to a siding of the Atlantic Coast Line Railroad at Pee Dee, east of the river, where they were unloaded by a Northwest crane with a 40-foot boom and a ½-yard clamshell bucket into three Ford 1½-ton trucks. The materials were then hauled about ½ mile to the batch plant and stockpiled for loading to the bin by a Lorain 40 crane with a 50-foot boom and an Erie ¾-yard clamshell bucket.

Bag cement was bought from the Universal Atlas Cement Co. at Leeds, Ala., and shipped about 450 miles to the same Pee Dee siding. Here it was unloaded by hand into dump trucks, and hauled to a cement storage shed made from a wooden framework covered with heavy paper, and located between the batch plant and the piers.

Alongside the aggregate bin on a level with the weighing batchers was a wooden platform holding two 550-gallon water tanks which were filled directly from the Pee Dee River by a Gorman-Rupp 2-inch centrifugal pump. As all concrete mixing was done in two Jaeger 2-yard high-dump truck-mixers mounted on Ford trucks, water for their drums was run by gravity from the storage tanks as the trucks backed under the batcher to receive the sand and gravel. The cement was added by hand as the trucks pulled alongside the platform of the cement storage shed which was built at the level of the top of the trucks.

A typical 11-bag batch which was mixed three minutes in the truck-mixer, during which the drum revolved 45 times, consisted of:

Cement	1,034 lbs.
Sand	1,750 lbs.
Gravel	3,982 lbs.
Water	54 gals.

Falsework Across River

While work was progressing at the pier on the east bank of the river, the contractor was erecting a wooden falsework trestle across the Great Pee Dee. This consisted of four-pile bents on 15-foot spans driven by another Northwest crane with a 35-foot boom using a 2,000-pound drop hammer in swinging leads. The piles, which were spaced 4 feet on centers in the bents, were 40 feet long with 6-inch tips and 15-inch butts and were driven to a 20-foot penetration. They were capped with 8 x 8's on which rested 4 x 12 stringers, eight to the span, to support a 12-foot deck made of 2 x 8's. Cross bracing was done with assorted 2 x 6's and 2 x 8's.

This trestle projected into the river at right angles to the east bank, and as the bridge is built on a skew the first river pier was on the north side of the trestle, and the next pier was on the south side. At this point a bend was made in the falsework span so that it followed the new line of the bridge for the remaining distance, being on the north side of the last two piers. By this change in direction of the temporary bridge, its total length was reduced, and easier access to the piers was achieved. At the site of the two center piers, 20-foot spurs were built off the trestle to furnish more space for the workers.

River Piers

The double footings for the two land piers with a resultant reduction in individual size made their construction a fairly routine operation, since no great pressure was exerted against the steel sheeting. In the four river piers, however, single footings were used, requiring the construction of a cofferdam 43½ feet long x 16 feet wide. The frame for this was assembled on shore and consisted of three rectangles of 16 x 16's, separated by 10-inch-diameter posts 8 feet high at each corner and two additional posts along each side, and with two 14 x 14-inch struts for cross bracing at each level.

After this framework was assembled it was picked up by the crane, maneuvered into alignment with the pier, and anchored in place by lashing it with steel cables to the falsework of the temporary bridge. When its location was checked, a section of steel sheet piling was driven at each inside corner to guard against further movement

(*Continued on next page*)

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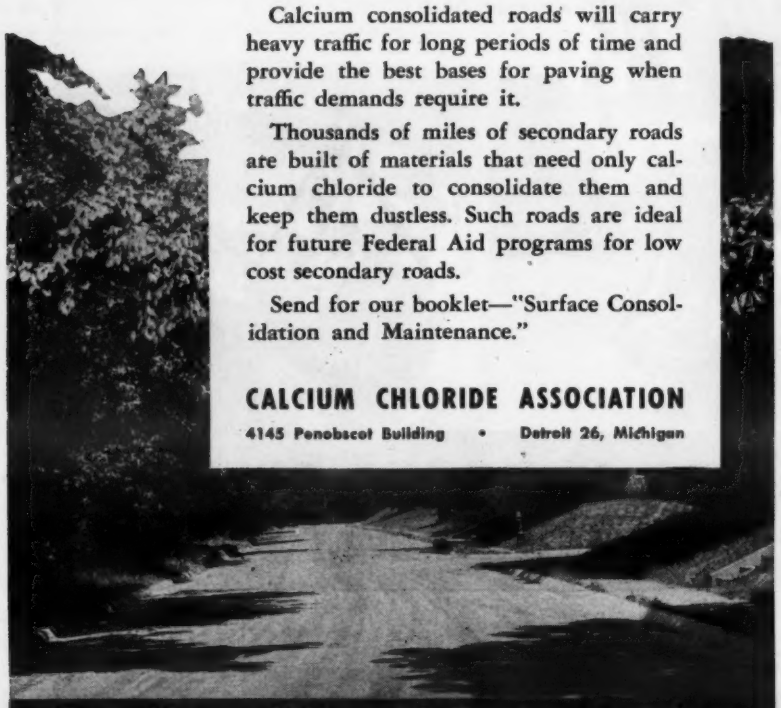

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C. & E. M. Photo
Concrete for pier footings for the Great Pee Dee River bridge was brought out over the falsework trestle by truck-mixer and chuted to the forms.

Trestles and Bridge Span Swamp and River

(Continued from preceding page)

while the sheet piling was being driven around the outside close to these horizontal wales or frames, the lowest of which rested on the bed of the river.

When all the sheet piling was driven, the cofferdam was excavated to grade, and the material piled around the outside. Sixty-nine wooden foundation piles were driven for each river-pier footing, after which a 4-foot-thick seal was poured. The cofferdam was then unwatered in a similar manner to the operations used on the land piers, and the piles cut off with a cross-cut saw at a corresponding elevation. Forms for the footings were then built inside the cofferdam to the 41 x 13½ x 5-foot dimensions.

Truck-mixers brought the concrete to the pier footing being poured, going in forward speed over the temporary bridge to discharge their contents down a chute into the forms, and then backing off the falsework to the shore where they speeded to the batch plant for more material. On the two land piers and the two nearest the shore the crane also helped in depositing concrete with a ¾-yard concrete bucket, filling up the end of the pier farthest from the haul road while the truck-mixers poured from the opposite side. The concrete was placed in 12-inch layers and vibrated by a couple of Mall vibrators. The average time required to pour a footing with this equipment was 10 hours; the footings and piers are reinforced concrete but the seals are of plain concrete. A Kohler light plant, 800 watts and 220 volts, was used to light the work if the pouring operations were overtaken by darkness.

The piers are 38 to 40 feet high, with a width of 6 feet 6 inches at the bottom tapering to 4 feet at the top, and were poured by the concrete bucket and the crane, the delivery being made by the two truck-mixers as before. When about 24 feet of pier was poured, which was to a height well above normal water, the sheet piling was pulled by a Vulcan No. 400-A pile extractor.

Quantities and Personnel

The major items on these six main river piers, which were constructed at a cost of $126,185, were as follows:

Excavation	2,305 cu. yds.
Concrete	1,736 cu. yds.
Reinforcing steel	53,896 lbs.
Untreated timber piling	8,900 lin. ft.

W. W. Waites, Superintendent for Barnwell & Rickenbaker, had a crew averaging seventeen men in the following categories: 2 crane operators, one at the bridge site and the other loading the batch-plant bins; a man discharging the aggregate bins; 2 men loading cement into the truck-mixers; 3 puddlers on the concrete chute and bucket; 2 vibrator operators; 2 carpenters; and 5 truck drivers, 2 on the truck-mixers and the others hauling materials.

Steel Superstructure

The contract for furnishing and erecting the steel superstructure for the 570-foot continuous-deck plate girders across the main channel went to the Nashville Bridge Co. of Nashville, Tenn., on its low bid of $64,650. The two plate girders have a depth of 7 feet over the piers which decreases to 5 feet 6 inches at the center of the spans, and are connected by 27-inch wide-flange (WF) 91-pound steel I-beams spaced 15 feet on centers. On top of these are 14-inch WF 30-pound steel stringers, set at 4½ feet on centers to support the 6-inch reinforced-concrete slab deck.

Construction of the deck was done by

(Continued on next page)

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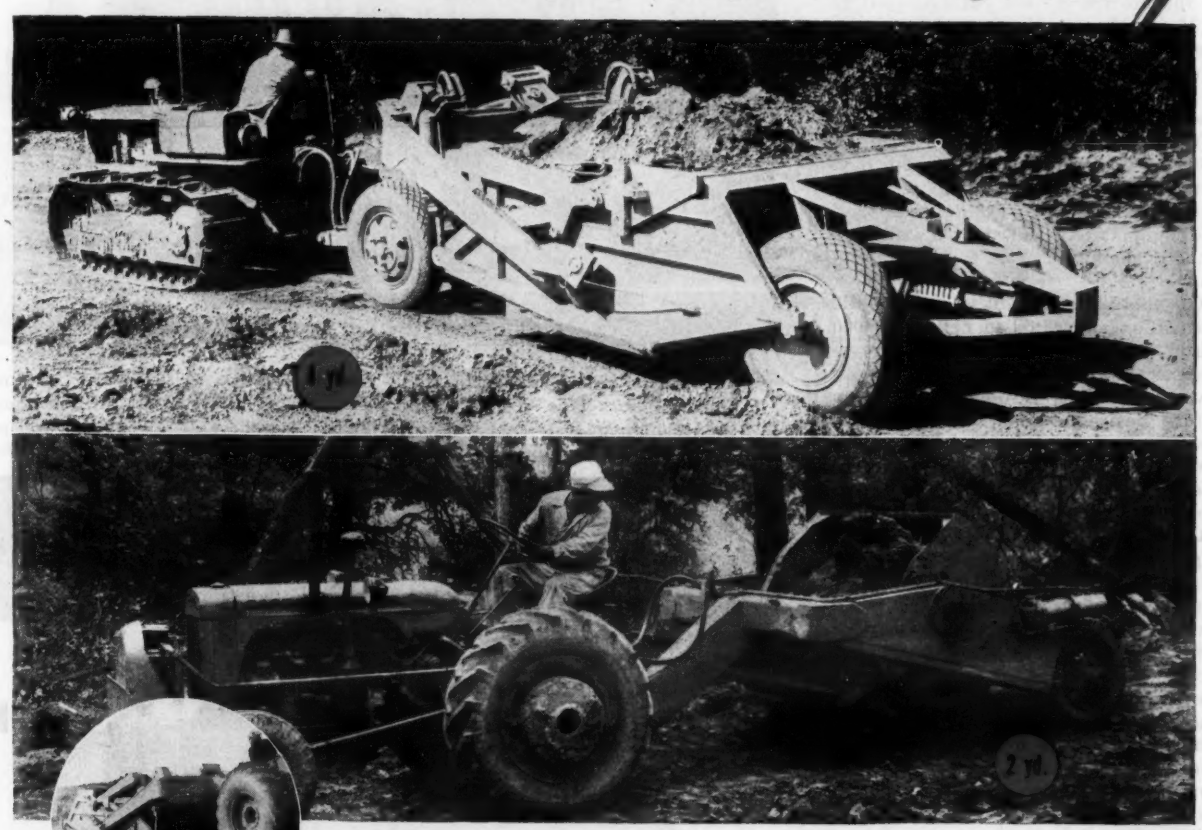

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Model	LENGTH OF HAUL IN FEET								Load, Turn and Dump Time	Pay Yards Per Trip
	200'	300'	400'	500'	600'	800'	1000'	2000'		
C-22	38	32	29	26	24	22	21	17	1.5 Min.	1.75
C-42	69	59	55	52	50	46	44	32	1.75 Min.	3.75

*Reg. U.S. Pat. Off.

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Job-Proved Equipment... for lowest possible cost in Moving Earth

Trestles and Bridge Span Swamp and River

(*Continued from preceding page*)

Barnwell & Rickenbaker for $32,135 which included the following principal items:

Concrete	475 cu. yds.
Reinforcing steel	96,643 lbs.
Pipe hand-rail	1,274 lin. ft.

Grading Contract

The contract for grading the approach fills was awarded to the E. W. Grannis Co. of Fayetteville, N. C., on its low bid of $221,000, but this work was subsequently sublet to Robert Lee of Manning, S. C. Of the 3 miles of approach fills, 2½ miles are on the west side of the river, with only ½ mile of embankment being built on the east side. The connecting pavement of U. S. 76 on each side is a 5-inch concrete base with 2 inches of asphalt surfacing.

All of the material needed for the fill on the east side of the river, totaling nearly 130,000 cubic yards, was taken from a 7-acre borrow pit along the bank of the river by a Bucyrus-Erie dragline with a 40-foot boom and a 1½-yard bucket. Transporting the sandy loam were five 15-yard bottom-dump Euclids moving over an average haul of ¾ mile. In the borrow pit the cut averaged 12 to 15 feet deep, with the dragline loading a Euclid in about 2½ minutes, which made the round trip of 1½ miles in about 13 minutes over a good haul road built in the form of a loop.

This equipment moved an average of 3,000 yards of material in a 12-hour day, with the leveling and shaping being done by a Caterpillar D8 and bulldozer, and compaction secured by a LaPlant-Choate sheepsfoot roller pulled by a Case rubber-tired tractor.

On the west side of the river the excavation amounted to nearly 250,000 yards, including the removal of an average of 2 feet of heavy gumbo in several locations through the swamp before desirable fill was placed. The necessary material for the 22-foot fill came from one cut section of 25 feet near the western end of the job, and from a 10-acre borrow pit located about 700 feet from the middle of the western approach. Most of the roadside cut and gumbo removal was done by a LaPlant-Choate 12-yard scraper pulled by a Caterpillar D8 tractor, with two other D8 tractor-dozers assisting. The Euclids were used in hauling the material from the borrow pit, and also for transporting sand-clay base-course material which was laid on top of the fill for a width of 23 feet and a depth of 1 foot. A haul of 2½ miles was necessary to obtain this special base.

The fills were built up in 8-inch layers, with good compaction from the sheepsfoot roller, until the final 40-foot roadway width was obtained. This spring 22-foot bituminous surfacing will be laid on the sand-clay base, with 9-foot shoulders on each side.

Quantities

The bid price in the original contract for grading, drainage, and paving of these two sections on both sides of the river was $221,000. A. K. Duncan was Superintendent for Robert Lee, the contractor, in charge of an 18-man crew. The major items included the following:

Excavation	428,600 cu. yds.
Sand-clay base course	15,600 cu. yds.
Reinforced-concrete pipe, 15 to 48-inch	584 lin. ft.
Plain-concrete pipe, 6-inch	3,300 lin. ft.
Binder course	170 tons
Sheet asphalt	157 tons
Bituminous surfacing, seal coat	36,025 sq. yds.

Concrete Trestle

Connecting with the main river crossing on the west bank is a 4,050-foot concrete trestle, while ½ mile further west over the embankment fill is another concrete trestle 600 feet long. These were built over sections of the swamp where the maximum efficiency for passage of flood waters could be obtained. The contract for this work was awarded to C. Y. Thomason & Co. of Greenwood, S. C., for the sum of $535,824. This trestle was built according to South Carolina Highway Department standards, and consists of four-pile bents on 30-foot spans, with two six-pile bents, on the same span distance, erected every 510 feet on the long bridge to afford extra rigidity to the structure. The 18-inch-square reinforced-concrete piles in the four-pile bents were driven 7½ feet on centers, with the two outside piles battered 1½ on 12. In the six-pile bents the piles are spaced 6 feet on centers.

Pile caps, 2½ feet wide x 2 feet deep x 25½ feet long, were poured on top of the 40-foot piles in the four-pile bent sections, with the piles projecting 2½ inches into the cap. The 6⅞-inch reinforced-concrete slab is carried on four beams 24 inches deep x 13½ inches wide.

Precasting Piles

For precasting the concrete trestle piles the contractor set up a batch plant near Winona on the west bank of the Great Pee Dee River, and laid about 800 feet of single track to connect the plant with the Atlantic Coast Line railroad. Stone for the coarse aggregate was shipped 100 miles to this siding in gondola cars from the Ryan Quarries at Ryan, S. C., while the sand was shipped in a similar manner, but only half that distance, from the Becker Sand & Gravel Co. at Cheraw, S. C. Bag cement was purchased from the Southern States Portland Cement Co. at Rockmart, Ga., and shipped about 350 miles to the job site.

The aggregates were unloaded from the cars either into a Heltzel 20-yard-capacity bin, or else stockpiled on each side of the bin by a P&H 206 crane with a 30-foot boom and an Owen ½-yard clamshell bucket. After the aggregate was weighed by a Kron dial scale, it was dumped into waiting Ford two-batch trucks, of which eight were required since the haul from the plant to the casting yard averaged 1½ miles. The cement was dumped by hand on top of the aggregate from a wooden platform as the trucks left the batch plant.

The casting yard itself was set up along the center line of each trestle being built, since the ground fortu-

(*Concluded on next page*)

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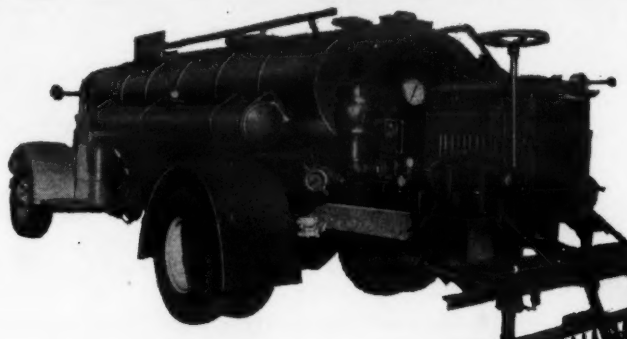

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Trestles and Bridge Span Swamp and River

(Continued from preceding page)

nately was stable enough to support the forms and the weight of the piles. The piles were cast in units of four in Metaform steel forms resting on a flat bed of 2 x 6 tongue-and-groove boards, supported by 2 x 6 joists held up by wooden 1 x 4-inch stakes 4 feet long. These stakes were driven from 2 to 3 feet into the ground on 18-inch centers, two rows of thirty stakes each being required on each pile. The steel forms came in 10-foot sections with a 5-foot pointed section at the tip, and had holes along the sides through which nails were driven into the wooden floor to keep the heavy forms from slipping. A space of 12 feet was left between pile beds so that the piles could later be picked up and driven directly in place without having to be rehandled.

Mixing of the concrete was done in a Rex 27-E paver, with water pumped from a nearby creek by a Jaeger 2-inch pump. The mixed concrete was dumped into a Blaw-Knox ½-yard R-31 bottom-dump concrete bucket and lifted by a Northwest crane with a 40-foot boom for pouring into the forms. When materials were flowing along smoothly twelve of these 40 and 45-foot 18-inch square piles could be poured in four hours. Curing of the concrete piles was done with Tru-Cure compound, and the steel side forms were removed after 24 hours although the curing of the piles continued for 24 days.

Driving of the piles was done by the Raymond Concrete Pile Co. on a subcontract, after which the caps and deck were poured by the principal contractor. The deck has a 26-foot roadway with two 2½-foot sidewalks.

Quantities and Personnel

On the construction of these two concrete trestles, totaling 4,650 feet in length, the following major items were included in the contract:

Concrete, caps and decks	6,217 cu. yds.
Reinforcing steel	1,377,310 lbs.
Precast concrete piling, 18-inch	29,280 lin. ft.

For the contractor S. C. Blackman is Superintendent on the concrete trestle construction while A. T. Clarkson and L. B. Cannon are Resident Engineers for the South Carolina State Highway Department on the five contracts totaling $979,794 for the mile of bridges and 3 miles of approach fills. This project is expected to be completed in the late summer.

The design and construction of the bridges are under the direction of the Bridge Division of the South Carolina Highway Department, of which C. R. McMillan is State Highway Engineer, and W. J. Gooding is Bridge Engineer.

Whiteprint Machine For Sheets or Rolls

A new printing and developing machine for reproducing tracings in highway department and contractors' offices has been announced by the C. F. Pease Co. The machine, the Pease 88-R, is a dry direct-process unit designed to produce whiteprints at a speed of 1 to 30 feet per minute.

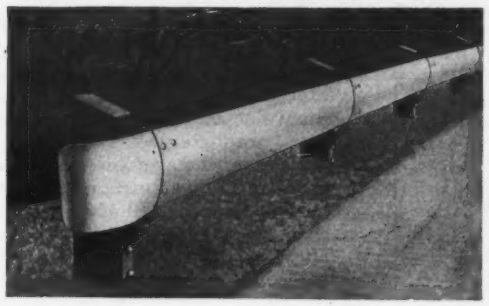
Tracings and sensitized papers, either single sheets or rolls, are fed to the 88-R by the operator and finished whiteprints are delivered in a few seconds. A 75-watt per inch high-pressure mercury tube is set within the contact cylinder to produce the proper light for printing, and to give an even flow of light over the full width of the tube. An Alzak reflector serves to utilize the maximum light value produced and as a variable light shutter.

The new machine features an exclusive Pease patent permitting the optional use of either revolving or sliding contact, controlled by a simple clutch lever. The unit has an arc welded structural-steel framework, with 18-gage sheet-metal exterior. All parts exposed to the ammonia developing fumes are fabricated of stainless steel or aluminum.

Details of the 88-R may be obtained by writing the C. F. Pease Co., 2631 W. Irving Park Blvd., Chicago, Ill.

Povlsen Joins Maguire

The appointment of Paul K. Povlsen as Vice President and General Manager of Maguire Industries, Inc., New York City, has been announced. He will supervise all operations of the firm and its subsidiaries, assisted by Walter B. Scott. Both were formerly associated with the J. I. Case Co., which Mr. Povlsen served as Vice President in charge of production.



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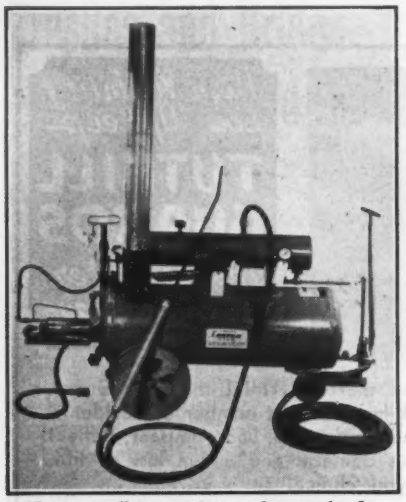

The new Cooper steam cleaner is designed to maintain a pressure of 70 pounds for cleaning equipment and parts prior to overhaul or painting.

Spray Steam Cleaner Operated by One Man

Designed for use in maintaining construction and road equipment, shop machinery, motor trucks, and other units, a new steam pressure cleaner has been announced by the D. C. Cooper Co. Operated by one man, the cleaner is said to provide speedy removal of grease, dirt, and grime, under a spray of steam and chemical compound.

The unit is mounted on wheels and comprises a burner capable of producing steam in 10 minutes, a 30 or 40-gallon water tank, a 7-gallon fuel-oil tank, an automatic water injector, and a rubber-tubing safety device. Sturdily made of boiler-plate steel, the Cooper cleaner maintains a constant pressure of 70 pounds.

Full details concerning this industrial steam cleaner are obtainable from the D. C. Cooper Co., 20 E. 18th St., Chicago 5, Ill. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

Features of Additives In Lubricants Discussed

The development during the last decade of small-sized medium and high-speed diesel engines for tractors, trucks, and other industrial applications created lubrication problems which necessitated the extensive use of additives in heavy-duty motor oils, the magazine *Lubrication* says in a recent issue. Copies of this publication which reviews the role of additives in modern lubrication, discussing their various functions and types, may be secured by those interested direct from The Texas Co., 135 E. 42nd St., New York 17, N. Y.

A lubrication additive may be defined as a chemical compound which, added to an oil, imparts new properties to it, or improves those already possessed. They are used as anti-oxidant, anti-corrosive, or detergent elements in the lubricant, or as extreme pressure agents, pour-point depressants, or viscosity-index improvers. Additives are mixed in low concentrations, varying from 0.01 to 5.0 per cent.

Oxidation, which occurs when oil is exposed to air, is the major cause of lubricant deterioration, and produces acidic reactions that lead to bearing corrosion and sludge. Anti-oxidant additives increase the oil's resistance to oxidation by reducing the amount of oxygen the lubricant takes up.

Light-weight metals developed for modern engine bearings may suffer corrosion from ordinary well-refined uninhibited oils, especially at high temperatures. Corrosion sets in as a reaction between the acidic products of oxidation, and one of the constituents of the bearing metals. It is controlled by inhibiting oxidation completely, or by putting a protective film on the surface of the bearing to prevent the acid reaching the metal. Anti-corrosive additives supply this film and serve also as "poisons" for other metal surfaces in the engine.

Detergents are additives which prevent the building up of deposits that interfere with the efficient operation of an internal-combustion engine, or serve to remove those already formed. Dispersants are detergent-type additives which prevent the agglomeration of the particles of fuel combustion in suspension in the oil so that filters and strainers remain unclogged for longer periods.

The maintenance of an oil film between moving metal surfaces is of paramount importance in lubrication. In cases of high pressure, the lubricant is often forced out and seizure of the metals occurs. To forestall this, additives known as extreme-pressure agents have been developed. These give the necessary load-carrying properties to the oil.

The lowest temperature at which an oil will flow is called its pour point. Wax raises this pour point, but it is not desirable to remove the wax completely. Various pour-point depressants have been developed to lower the flowing point of lubricants that contain wax. To extend the temperature range of oils having relatively low fluidity, viscosity-index improvers have been developed. "VI" indicates the rate of change of the fluidity of an oil in relation to temperature.

Science does not fully understand the processes which these chemical additives go through during the oxidation cycle. But it does have evidence that additives have improved the qualities of the lubricant, extended its life, and aided greatly in engine upkeep, the article states. Great strides have been made, and greater ones are ahead.

Du Pont Reorganizes Its Explosives Division

Major changes in the organization of the Explosives Department of E. I. du Pont de Nemours & Co., Wilmington, Del., have been announced. In the course of the reorganization, P. J. Kimball, General Superintendent of the Explosives Department, has been named Manager of the Explosives Division. The Division's Manager, F. R. Wilson, is now Director of Production, succeeding T. R. Carlson, who has become Production Manager of the High Explosives Section. H. C. Peinert has been made Production Manager of the Black Powder Section, succeeding the retired I. J. Cox.

Emergency Cutting Pack

A pack-type flame cutting outfit, designed originally for use by the Navy, is now being offered to highway departments and the construction industry. This emergency equipment is described in a 4-page folder available from the firm. Carried on the back, the kit includes oxygen and acetylene tanks, cutting torch, leather gloves, goggles, and other equipment, and a manual of instruction.

Those charged with safety and emergency work who desire copies of the folder, Form 69, can obtain them by writing the Victor Equipment Co., 844 Folsom St., San Francisco 7, Calif. Mention CONTRACTORS AND ENGINEERS MONTHLY.

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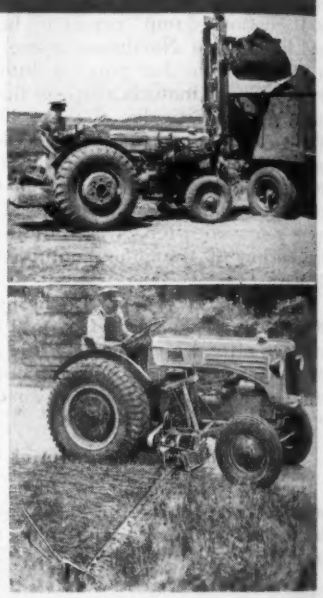
Complete specifications will be furnished on request. Also get facts on the new MM side-mounted highway mowers.



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Preliminary Work For Dam and Canal

Pile Driving for Cut-Offs And Small Gravel Dredge On South Platte River, Nebr., Morrison-Knudsen Contract

By FRANK B. SARLES

✦ THE Morrison-Knudsen Co., Boise, Idaho, is constructing a diversion dam near North Platte, Nebr., under a contract with the Platte Valley Public Power and Irrigation District. The job includes interesting features of pile driving and the production of concrete aggregates.

The Platte Valley Public Power and Irrigation District is an important part of the Nebraska Public Power System and operates extensive power and irrigation works in the west-central section of the state. Existing facilities of the N. P. P. S. also include the Kingsley storage reservoir near Keystone, owned by the Central Nebraska Public Power and Irrigation District and located on the North Platte River, with a capacity of 2,000,000 acre-feet, from which the District conducts water down the south side of the North Platte valley, through the divide between the North and South Platte Rivers, under the South Platte River, and to the hills on the south side of the South Platte valley. The comparatively heavy fall of the river channels permits this water to be carried eastward on the south side of the valley to a power-generating plant near the city of North Platte where a 205-foot head produces 36,000 kilowatts hourly through two generating units. The water is then returned to the Platte River for irrigation in Dawson County between Gothenburg and Kearney where 135,000 acres of land are irrigable. The demand for irrigation water varies from year to year with the rotation of crops but it is ordinarily utilized by approximately 60,000 acres per year. Since rainfall in the area approximates 20 inches annually, the need for supplemental water is caused primarily by seasonal rather than annual deficiency.

The South Platte project, of which the Morrison-Knudsen contract is a part, contemplates the diversion of about 235,000 acre-feet of water annually from the South Platte River (not now utilized as a water source by the District) through the 180,000-acre-feet storage of the Sutherland reservoir where its high silt content will aid in sealing this storage to reduce the excessive loss which now occurs there. The flow then conducted into a canal will provide more water for the generation of power at North Platte. Under present methods of operation, this plant produces 175 kilowatt-hours of energy per acre-foot, and the newly diverted water can be delivered to the power plant with a loss of less than 20 per cent.

The present construction on the South Platte River includes a concrete sluiceway and diversion dam 494 feet long, 350 feet of compacted earth dike, 600 feet of fuse-plug dike, and 6½ miles of unlined earth canal with a capacity of 1,000 second-feet to conduct the water from the diversion dam to the canal carrying water from the Kingsley reservoir to the North Platte power house. The concrete portion of the dam is designed to pass 25,000 second-feet

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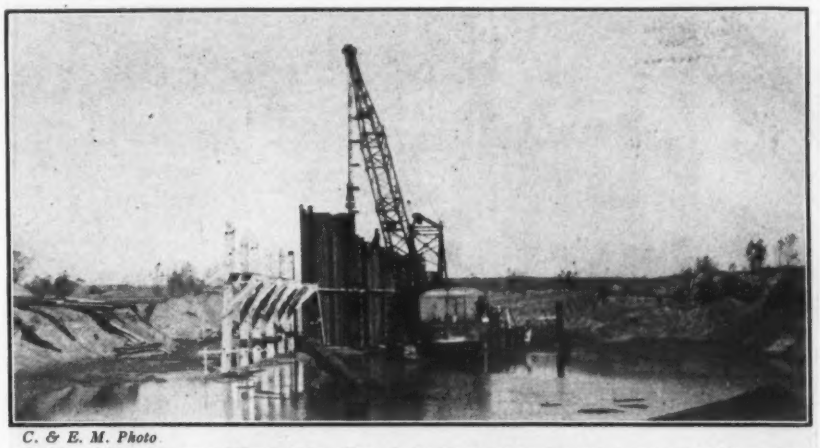

C. & E. M. Photo

Guide piling was used in driving the steel sheet piling for the cut-off wall under the axis of the 494-foot diversion dam on the South Platte project. A Northwest crane was used in both pile-driving operations.

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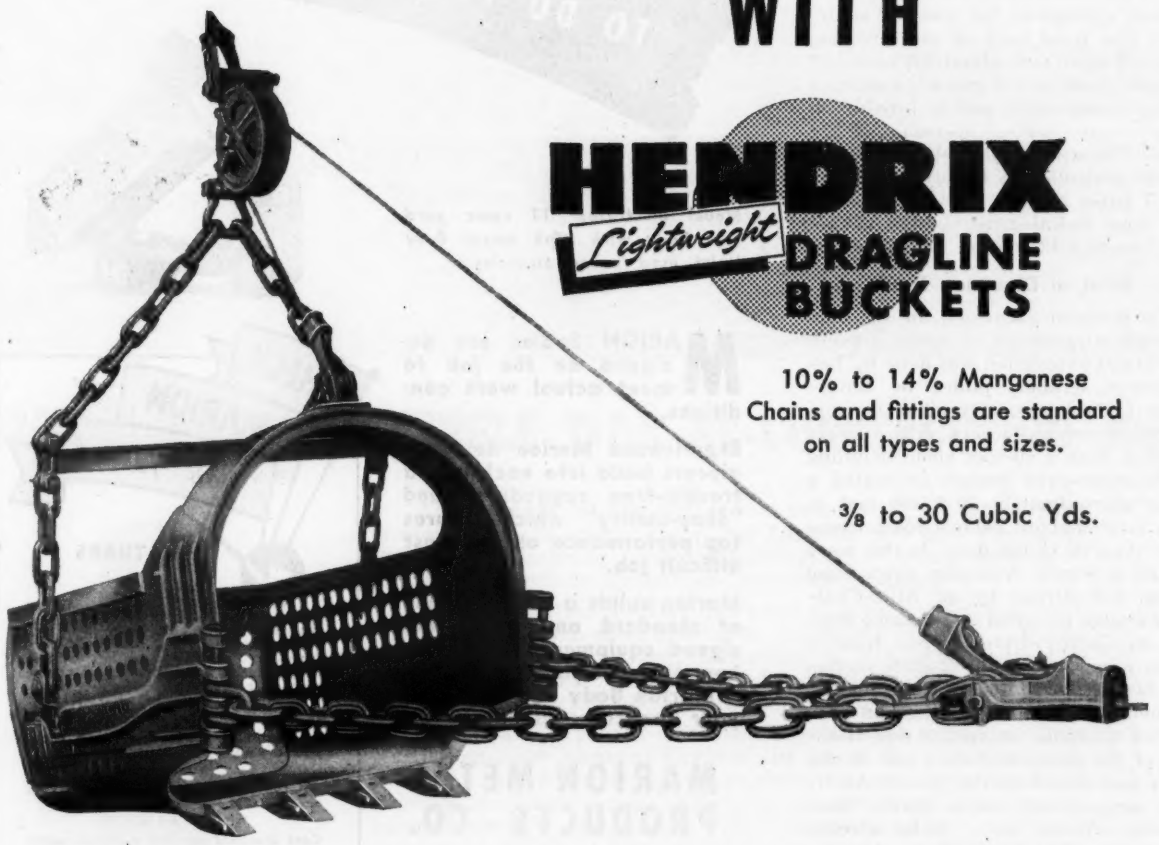
HENDRIX Lightweight DRAGLINE BUCKETS



10% to 14% Manganese
Chains and fittings are standard on all types and sizes.

⅜ to 30 Cubic Yds.

★ 20% to 40% lighter than other buckets, type for type.
★ All welded construction for greater strength and durability.
★ Manganese Steel chains, fittings, and reversible tooth points.
★ Full Pay Load every trip, even in wet diggings.
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★ Three Types; light, medium, and heavy duty. With or without perforations.

You automatically step up the YARDAGE of your dragline by hooking up a Hendrix Lightweight Bucket! It's 20% to 40% lighter than other buckets, type for type! Can be used on a machine designed for small operations and still maintain the allowable loaded weight. You'll get bigger payloads on operations requiring a long boom, and in wet digging you'll increase your payloads by leaving the water in the pit. We took the load *out of the bucket* . . . to let you put it *inside!*

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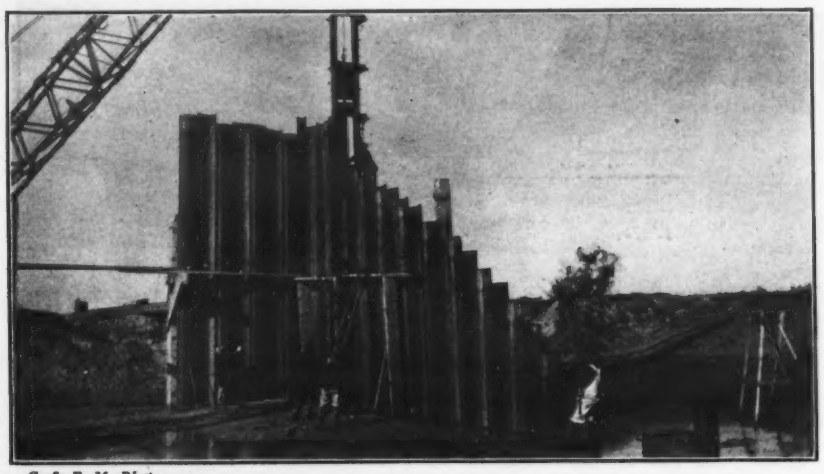

C. & E. M. Photo
The Morrison-Knudsen contract on the South Platte River project included a steel sheet piling cut-off wall under the axis of the dam. Here a worker adjusts the head block at the top of a pile.

Preliminary Work For Dam and Canal

(Continued from preceding page)

of water safely without overtopping the fuse-plug dike, and since there has been only one flood in the past 50 years in excess of that discharge figure, the fuse-plug dike will probably never be called upon to provide anything but a feeling of safety to those responsible. Should an excessive flood occur, however, to overtax the capacity of the concrete spillway, the fuse-plug dike would go out and pass the excess water without damage to the concrete structure. The pond back of the diversion dam will store only about 400 acre-feet of water, sufficient to prevent excessive silting in the canal and to provide an ice cover for winter operation of the canal. The water level behind the dam will be controlled by twenty 20 x 6-foot radial gates on the crest of the dam and three radial gates, a 10 x 13-foot and two 20 x 13-foot, in the sluiceway.

Start of Diversion Dam

The material excavated for the dam foundation consisted of sandy gravels. The initial excavation was done by LeTourneau scrapers pulled by Caterpillar D8 tractors, and other tractors equipped with bulldozers. A Northwest dragline with a 60-foot boom handling a 2½-cubic-yard bucket excavated a sump approximately 40 x 100 feet in area, located about 100 feet downstream from the axis of the dam. In this were floated a 6-inch American centrifugal pump, belt-driven by an Allis-Chalmers engine mounted on the same float, and an electric-driven Byron Jackson sump pump having a 12-inch suction and two discharge lines of 6 and 10-inch diameter. When pile driving had been started, a smaller sump was dug at one end of the dam excavation and in this sump was placed another 6-inch American sump pump on a timber float, directly driven by a 20-hp electric motor placed above it. Later foundation excavation was performed by a Bucyrus-Monighan walking dragline handling a 7½-cubic-yard bucket on a 110-foot boom.

On the high river bank about 200 feet from the south end of the dam the contractor constructed a frame building covered with roofing paper to house the units for the generation of the electric power to be used around the job during the construction period. These consisted of two General Electric 100-kw generators mounted on separate concrete-block foundations, one driven by a direct-connected Cummins diesel engine operating at 720 rpm, and the other belt-driven by a second Cummins diesel engine.

Driving Piles

When a portion of the excavation had been completed, the dragline bucket was removed from the Northwest and replaced by 25-foot swinging steel leads with a 2,800-pound drop hammer to drive guide piling. For this purpose the contractor used posts at 15-foot centers made of four pieces of 3 x 12-inch rough lumber. The maximum length obtainable was 16 feet, so alternate pieces were butt-joined to provide 24-foot piles with the splices staggered. The 3 x 12's were laminated to form 12 x 12's by thirteen 9/16-inch bolts, doubled at the butt splices, with 4 x 4 x 3/16-inch cover plates. These unsharpened guide piles were driven vertically 6 feet on a line 2 feet away from the center line of the steel sheet piling which they were to guide, and protruding 18 feet from the bottom of the excavation.

After the piles were driven, a piece of 2 x 12-inch lumber was bolted to the pile, 6 feet below the top, and extending horizontally beyond the line of the sheet piling. This piece was knee-braced by a 2 x 12 and carried two lines of 2 x 12-

(Continued on next page)

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Model illustrated: 12 cubic yard coal body with HD-8 Heavy Duty Hoist, used in coal stripping.

MARION Bodies are designed on the job to meet actual work conditions.

Experienced Marion field engineers build into each unit a trouble-free ruggedness and "Stay-ability" which assures top performance on the most difficult job.

Marion builds a complete line of standard and special-designed equipment. No matter how different your job, there's a Marion Body and Hoist for your particular hauling needs.

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FEATURES

Marion Hoists have self-equalizing double arm lift, a sturdily built subframe . . . operate under low uniform oil pressure . . . and lift well ahead of body center.

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Marion Pumps are equipped with Torrington needle bearings and phosphor-bronze wear plates.

★ ★ ★

Safety feature in the valve prevents accidental body dropping.

★ ★ ★

Cast Manifold permits mounting pump from one side to another without additional parts.

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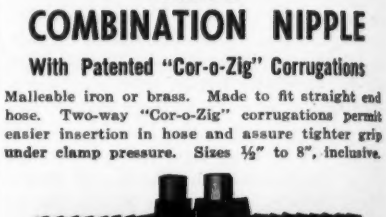
With Patented "Cor-o-Zig" Corrugations

Malleable iron or brass. Made to fit straight end hose. Two-way "Cor-o-Zig" corrugations permit easier insertion in hose and assure tighter grip under clamp pressure. Sizes ½" to 8", inclusive.



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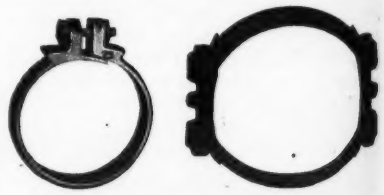

"KING" HOSE CLAMPS
Single and Double Bolt

Made of malleable iron. Easy to attach, and can be used over and over again. Tightening provides evenly distributed pressure around entire hose circumference. Double bolt style has quadruple take-up. Full range of sizes.

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Preliminary Work For Dam and Canal

(Continued from preceding page)

inch planks secured to it to hold the steel sheeting during driving.

Steel sheet piling for a cut-off wall was driven under the axis of the dam for 494 feet and at right angles to this line for 47½ feet at the north end and for 130 feet at the south end under the outlet structure to the canal. The sheet piling for the cut-off wall was Carnegie M-115, mostly 35 feet long but reduced to 15-foot lengths at the north line driven at right angles to the dam. In addition to the sheet piling forming the cut-off wall, another line was driven under the toe of the spillway apron, using 10-gage corrugated-metal piling in 10-foot lengths. The steel sheet piling, which was driven by the same Northwest crane used for driving the guide piling, was first placed in proper position vertically along the guide planks of the guide piling, threaded up as placed, and then driven by hitting each piece a few blows of the hammer and moving to the next piece. When the piling was well seated and properly headed down, the individual sheets were driven about 3 feet at a time before moving to the adjacent piece. While driving was in progress, two men steadied the bottom end of the swinging leads with ropes.

In the hard-packed water-bearing sand in which the sheet piling was driven, jetting proved to be economical on both the guide piling and the steel sheet piles. The contractor provided a jet made of 30 feet of 2-inch pipe, with its lower end reduced to a nozzle by cutting and welding so that in 3 feet the diameter was reduced to 1 inch. This jet was supplied with water through a 2-inch rubber hose from a 4-inch Gorman-Rupp centrifugal pump set beside the small sump in the north end of the dam excavation. The jet was handled by a ½-inch cable from an air hoist mounted on the side of the boom near the cab of the crane. Air power for the hoist was provided through a 1½-inch air hose from a portable 120-cfm Le Roi compressor stationed on the bank beside the foundation excavation.

Canal Construction

While the pile driving and foundation excavation continued, work got under way on certain sections of the canal where the construction of core banks was necessary. The plans required that core banks be built along all sections of the canal where the cut into the natural ground was to be less than 7½ feet. The core banks were built with an 8-foot-wide top, 2 to 1 slopes towards the canal and 1½ to 1 slopes away from it, and to an elevation 11 feet above the bottom of the finished canal.

Before construction of the core banks was commenced, a trench was cut 3 feet into the natural ground under the location of the core bank to assure the removal of any and all gopher holes which might exist under the location of the embankment. These cut-off trenches were excavated to a full scraper width and backfilled with material identical with that to be used in the construction of the core bank and compacted in an identical manner. Material from specially selected sections of the canal excavation or from nearby borrow pits was used for backfilling the cut-off trench and for the construction of the core banks.

C. & E. M. Photo

Morrison-Knudsen used a small dredging outfit to supply the aggregate for concrete and the road gravel for its contract on the South Platte project in Nebraska.

The latter were built in advance of the canal excavation by two 12-cubic-yard scrapers, a LeTourneau and a Wooldridge, pulled by Caterpillar D8 tractors. The material had a moisture content of from 6 to 8 per cent. Since the optimum moisture for compaction varied between 12 and 16 per cent, it was necessary to do considerable sprinkling during spreading. For adding this water, two 500-gallon tank trucks were used. They were loaded by a 3-inch Rex Speed Prime pump at a water course about a mile from the work and discharged their loads by gravity through perforated-pipe spray bars. The 6-inch lifts were compacted

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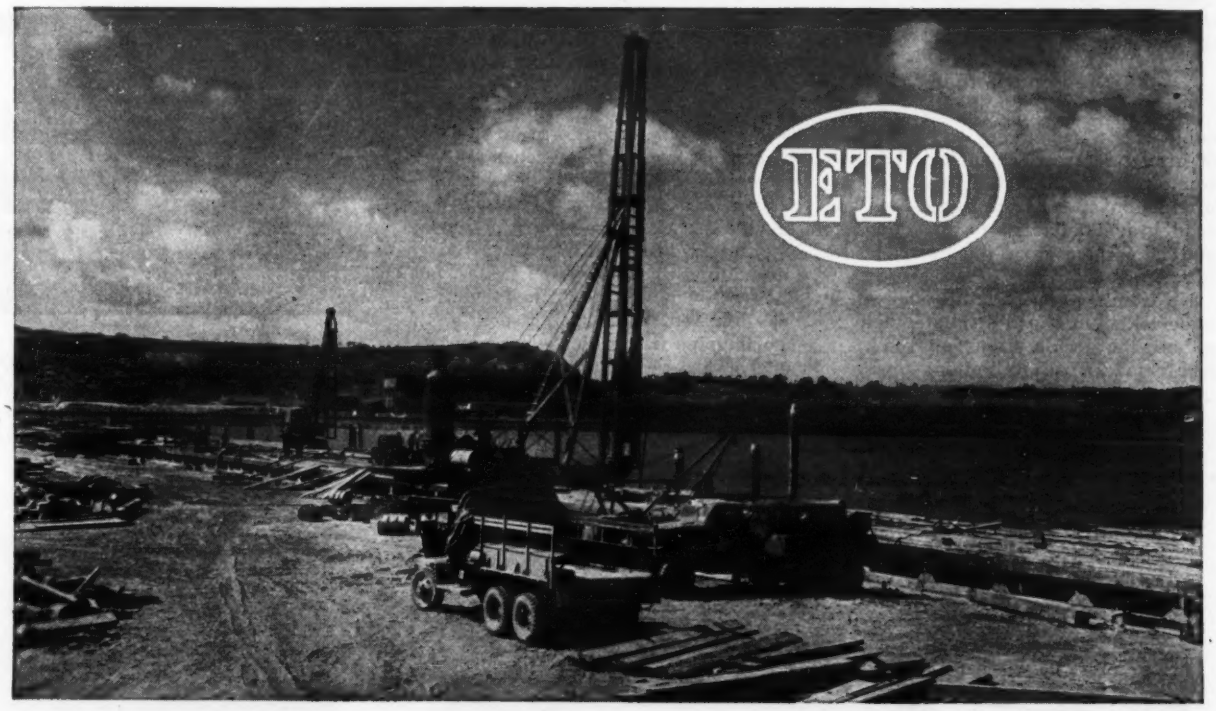

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The greatly expanded manufacturing facilities of the two large McKiernan-Terry plants at Harrison and Dover, N.J., are now available to you for postwar projects involving the use of pile hammers, hoisting equipment, marine equipment and special machinery manufactured by McKiernan-Terry. With McKiernan-Terry equipment you can be SURE of best results at least cost. . . . Write for free Bulletins.

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Combines power hammer speed with hand sledge adaptability. Enables one smith to handle every type of hand forging operation without helpers. Permits absolute control of weight and speed of blows. Allows jobs formerly requiring several heats to be completed in one. Increases capacity and output; saves time and labor. Ask for descriptive Bulletin No. 56.

Veteran-ize your personnel! Many discharged war veterans received valuable technical and specialized training. Always consider veterans when you employ. They did their share—now let's all do ours!

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All widths lengths, and thicknesses, punched ready to fit your machine.

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MANUFACTURING COMPANY
Established 1884
BUCYRUS, OHIO.

Preliminary Work For Dam and Canal

(*Continued from preceding page*)

by a sheepsfoot roller with four 4-foot-diameter drums pulled by an Allis-Chalmers HD tractor. A minimum of six passes of the roller was specified, and this resulted in 100 per cent Proctor compaction of the material.

Two 9-hour shifts were operated on this phase of the canal construction. Lighting for the night work was obtained from a 1.5-kw Kohler plant. It was housed in an 8 x 10-foot shed which also provided storage for lubricants. The house was mounted on a sled of 8 x 12 timbers to facilitate moving by tractor as required. Three 500-watt floodlights, adjustable for direction, were set on the roof of the house and lighted the night operations most successfully.

Following the construction of the core banks, the canal was excavated by the same Monighan used for excavation at the dam site.

Dredging Gravel

Since the two contracts included 4,841 cubic yards of concrete and 2,100 tons of gravel for road surfacing, the contractor decided to install a plant for the production of concrete aggregates and road gravel adjacent to the dam site and take them from the South Platte River.

No similar production had been undertaken in the immediate vicinity, although other locations on the river had provided an unlimited supply of acceptable material. It was therefore decided to begin the operations with a rather small and readily portable outfit well in advance of the need for the material so that there would be sufficient time for exploration and stockpiling before the demand became greater than the capacity of the production unit.

To remove the material from the river, the contractor constructed a small dredging outfit. On a 14 x 24-foot timber float was mounted near one end a Hetherington & Berner 6-inch centrifugal pump. This pump was placed with the center line of the drive shaft parallel to the end of the float and extending back of the pump to two pulleys. The pulley nearest the pump casing carried the belt drive from a 74-hp Allis-Chalmers gasoline engine mounted at the other end of the float. The shaft extended beyond this pulley to a second one from which a belt transmitted power to a lever-and-friction-wheel single-drum hoist.

From the suction end of the pump a 6-foot-long 6-inch rubber hose extended forward to the edge of the float where it was attached to a 90-degree elbow which in turn connected it with a 20-foot length of 6-inch spiral-welded steel pipe parallel to the long side and extending to the rear of the float. At the end of this pipe a second 90-degree elbow joined it to a 6-foot length of similar pipe which hung vertically when the 20-foot piece was horizontal. This, of course, caused it to assume a position between the vertical and the horizontal, at right angles to the direction of the 20-foot-long pipe, when the free-swinging end of the longer pipe was lowered. The suction end of the shorter pipe was protected by a cage of steel straps welded over it to prevent the entrance of any piece of gravel or other object too large to go through the suction line or the pump.

The line of the long suction pipe and the shorter pipe at right angles to it was controlled by raising or lowering the elbow joining the two pipes, the other end of the longer pipe moving only through the flexibility in the 6-foot hose connecting it to the pump suction. Raising and lowering of this elbow was accomplished by a ½-inch steel cable which ran from a chain fastened around the elbow, over an A-frame constructed at the corner of the float on the same side but the opposite end from the pump, down to floor level and under the frame of the Allis-Chalmers power plant, and back to the single-drum hoist. This hoist was operated by a lever man who could put the friction drive into action by merely moving the lever to turn the hoist and thus raise the suction line, release it to reverse and let gravity lower it, or dog the hoist to hold the suction line stationary.

The 6-inch discharge line extending off the other side of the float to the gravel screening plant was plainly visible to the lever man at all times and he raised and lowered the end of the suction line in accordance with the discharge to the plant. Plugging troubles occasioned by caving around the suction head did occur, but an alert lever man could reduce them materially and add considerably to the daily production of the pumping unit.

Special provision was made for easy priming of the large pump. It consisted of a 1-inch centrifugal pump mounted on a framework of 1-inch steel angles beside the Allis-Chalmers engine which drove the entire plant, and was belt-driven by it from an extra pulley on the engine fan shaft. The suction line went off the end of the float to just below the water level of the river and the discharge was carried by a flexible hose to a nipple in the top of the large pump casing. This nipple carried a valve between it and the pump frame with a by-pass for the discharge of the water

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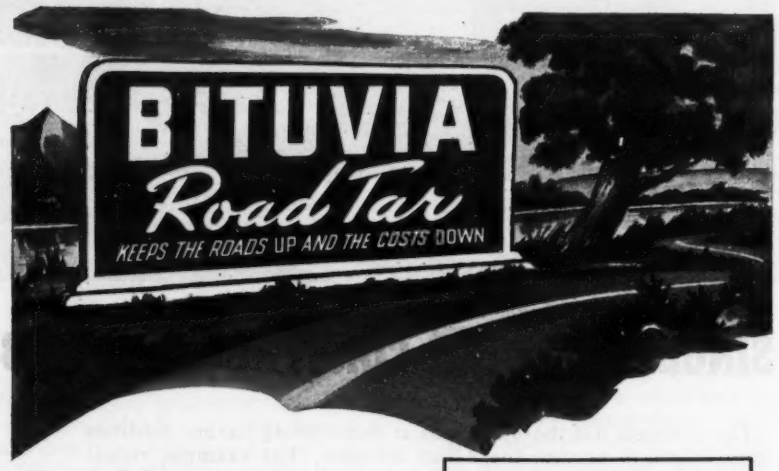

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REILLY also produces other materials which you will need in your construction program. A few of these materials are listed at the right. A Reilly engineer will be glad to give you complete information on any of these products.

Pocket-size BITUVIA manual containing valuable road construction data will be sent on request.

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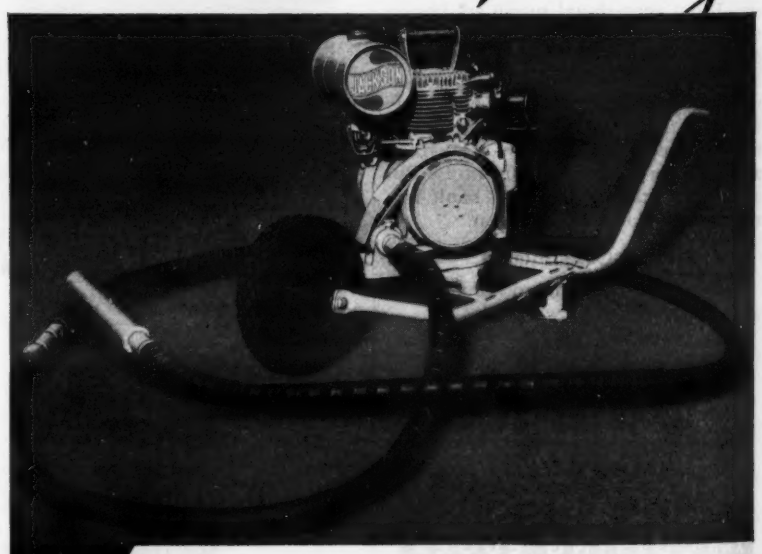
A HIGHLY *Dependable* INDEPENDENT UNIT of WIDE *Adaptability*



Available with three standard vibrator heads for thin, thick and medium sections and powered by a husky, dependable Wisconsin engine, the JACKSON model FS-6A does a perfect job of handling the stiffer more economical mixes in an exceedingly wide range of operations. Flexible shaft (1/2" core) is furnished in 7' to 14' lengths up to 28 ft. Unit has full swivel, dirt-proof base. Variable speed control up to 7500 V.P.M. Wheelbarrow with drop handles is optional. A highly advantageous unit for the general concrete contractor — built to the high standards of quality for which JACKSON equipment has always been famous. See it at your JACKSON distributor or write for complete information. The JACKSON line contains the best bet for every specific concrete vibratory purpose.

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C. & E. M. Photo

A 6-inch line from the gravel dredge, at the left, rose 25 feet in 50 feet to discharge against a 3 x 6-foot scalping screen at the top of the screening plant.

Preliminary Work For Dam and Canal

(Continued from preceding page)

when it was not needed for priming.

The 6-inch discharge line from the pump rose approximately 25 feet in a distance of 50 feet and discharged against a 3 x 6-foot scalping screen, covered with 1¼-inch mesh and set at an angle of about 30 degrees from the vertical. Oversize material rejected by this screen fell to the ground at the end of the screening plant. Water-borne material passing the screen fell onto a platform about 10 feet long and 6 feet wide which sloped towards the storage bin at a rate of 1 in 10.

At the lower edge of this platform the material washed against a piece of 2 x 8-inch lumber swung by wires from a light framework constructed above the platform and held horizontally at the grade of the lower end of the platform, its 8-inch face towards the oncoming discharge from the scalping screen. Striking this splash board reduced the velocity of the material somewhat and it dropped onto a 10 x 3-foot wood frame sloping at an angle of 45 degrees down from the edge of the platform to the top of the storage bin. This frame, divided into three 36 x 40-inch rectangles by two cross braces, was covered with ¼-inch-mesh screen so that material of a diameter larger than ¼-inch slid across it into a 5-cubic-yard wooden bin used for storage. The material finer than ¼-inch, along with the water, passed through this screen and fell into a 6 x 36-inch metal trough set under the screen to carry the water and fine material to a waste pit at the end of the screening plant.

The ¼ to 1¼-inch material produced was hauled to the stockpile of road graveling material for future spreading on access roads around the dam and along the bank of the canal. Production of this material averaged between 150 and 175 cubic yards per 9-hour shift, and the plant was operated by a foreman and two men.

By changing the screens and using a sand classifier under the discharge from the metal trough, satisfactory sand and gravel for the concrete work were also economically produced.

Bid Items and Personnel

The major bid items of this contract, which was awarded under two schedules, include the following:

Schedule 1

River diversion	lump sum
Clearing river channel	80 acres
Excavation, unclassified	26,300 cu. yds.
Stripping for compacted fills	6,000 cu. yds.
Borrow excavation	13,000 cu. yds.
Pumped embankment	12,000 cu. yds.
Compacting embankment	34,000 cu. yds.
Backfill	2,500 cu. yds.
Compacting backfill	1,000 cu. yds.
Overhaul	200,000 sta.-yds.
Concrete in overflow dam and overflow weir of canal intake	1,072 cu. yds.
Concrete in apron of dam and sluiceway floor	1,778 cu. yds.
Concrete in walls, walkways, intake structure floor, and miscellaneous structures	1,391 cu. yds
Furnishing and placing reinforcing bars	369,400 lbs.
Placing steel sheet piling Type M-115	584,600 lbs.
Placing 10-gage corrugated sheet piling	57,700 lbs.

Schedule 2

Unwatering foundations	lump sum
Excavation for canal	832,000 cu. yds.
Excavation for structures	855 cu. yds.
Excavation for highway and drainage	20,000 cu. yds.
Stripping foundation for embankment and surface of borrow pits	4,000 cu. yds.
Backfill	1,000 cu. yds.
Compacting backfill	600 cu. yds.
Excavation for core banks	42,000 cu. yds.
Compacting embankment	30,000 cu. yds.
Overhaul	150,000 sta.-yds.
Gravel-surfacing highway	2,100 tons
Concrete in canal and highway structures	600 cu. yds.
Furnishing and placing reinforcing bars	62,000 lbs.
Furnishing and driving treated-timber piling	4,312 lin. ft.

The contract for both schedules on the South Platte project was awarded on August 9, 1945, by the Platte Valley Public Power and Irrigation District to the Morrison-Knudsen Co., Boise, Idaho, on its low bid of $282,165.90 for Schedule 1 and $241,917.06 for Schedule 2.

Work was commenced on September 2, with a total of 270 days allowed for completion. For the contractor the work is under the direction of Project Manager V. A. Roberts. For the District, the work is under the supervision of J. F. Mesmer, Hydraulic Engineer.

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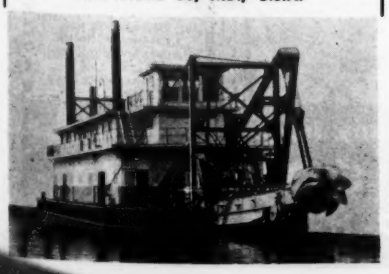

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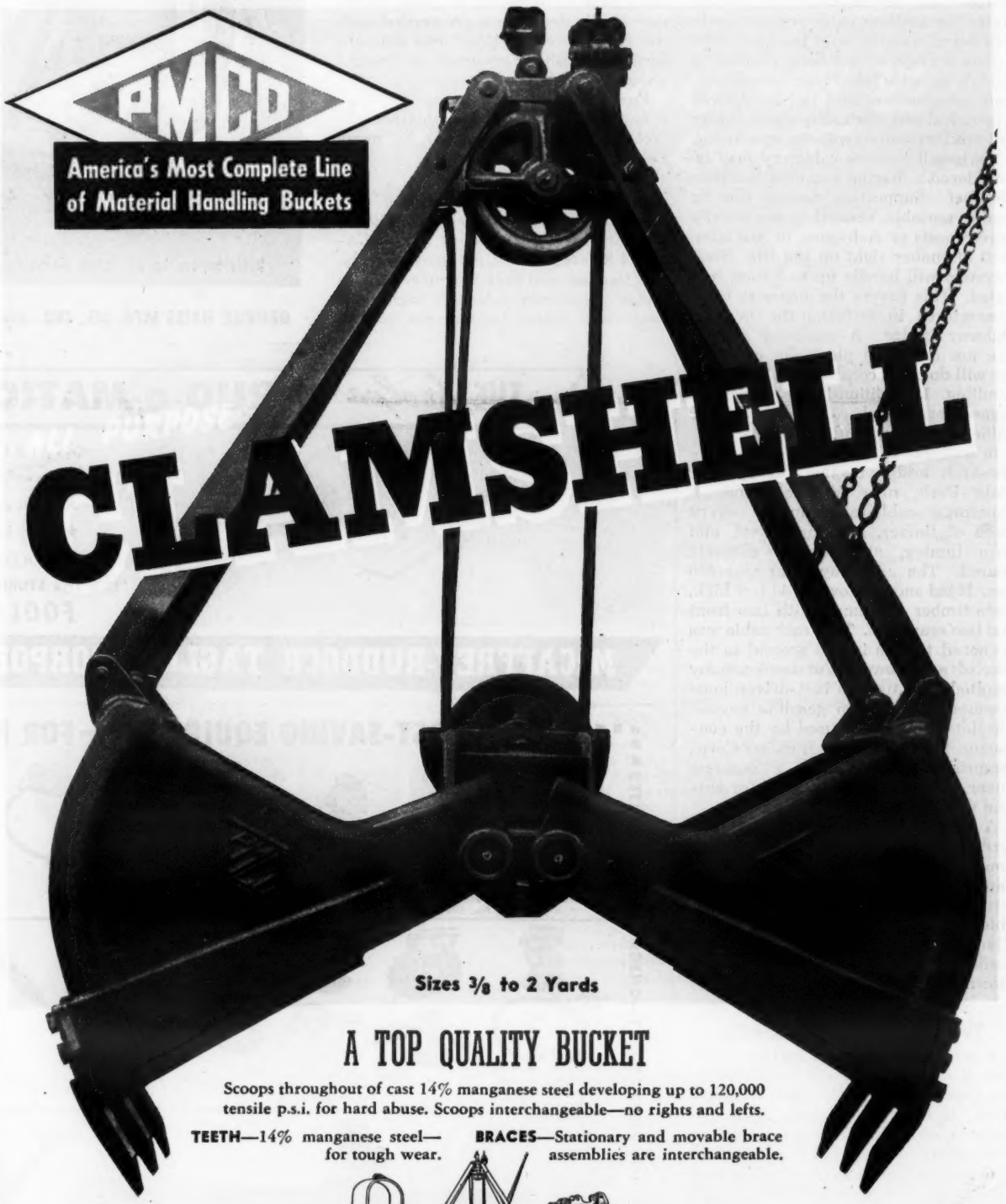

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TEETH—14% manganese steel—for tough wear.

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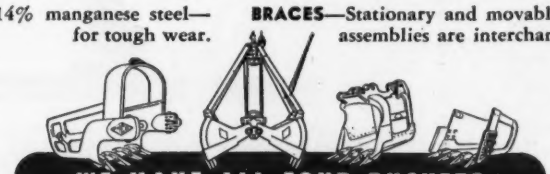

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WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES.

The Sauerman tautline cableway, now available in smaller units is adaptable to many bridge and similar average-size jobs. Here one of these cableways is shown in use on a highway bridge job in Indiana.

Cableways Adapted To Small-Job Needs

With the development of smaller units, the tautline cableway, formerly considered suitable only for huge construction projects, has been adapted to the average-size job. These new Sauerman machines are said to have proved economical and efficient in many bridge and similar concrete-placing operations.

The small tautline cableway may be considered as having a span of less than 600 feet. Supporting towers can be readily portable, since they are usually guyed masts or A-frames, or are often built of timber right on the site. Such a system will handle up to 5 tons, it is stated. This covers the heaviest loads encountered in building the average highway bridge. A cableway of this size not only will place the concrete, but will do other construction-materials handling. In addition it will operate in rugged terrain, where deep ravines or gullies present difficult problems.

In building a 250-foot concrete hollow-arch bridge in the Turkey Run State Park, near Marshall, Ind., a Sauerman cableway handled every piece of timber, structural steel, and form lumber, and all the concrete poured. The cableway span was 460 feet. Head and tail towers, 40 feet high, were timber A-frames, with two front and two rear guys. The track cable was anchored to logs in the ground to the rear of each tower. Further economy resulted from using a belt-driven hoist powered by a 50-hp gasoline engine. The total equipment used by the contractor, Mustard-Curry Building Corp., comprised the cableway, a concrete mixer, and a portable sawmill for cutting the form lumber.

A profusely illustrated booklet describing small tautline cableway systems in detail has been prepared by Sauerman Bros., Inc., manufacturer of scrapers and cableways. Copies may be obtained by writing the firm at 464 So. Clinton St., Chicago 7, Ill., and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Tractor-Shovel Bulletin

Features in the design and construction of its tractor shovel are shown by the Lessmann Mfg. Co., 20th & Easton Blvd., Des Moines 4, Iowa, in a new bulletin. Available on request, the bulletin points out that the Lessmann shovel digs close to the tractor, has its push against the rear axle, is balanced close to the machine in carrying to offset tipping, and delivers its load easily through its mechanically controlled hoist. Special attention is given the exclusive Lessmann rear hoisting assembly. Specifications for Models 10-25 and 10-35, in ½-yard and 3/5-yard capacities, are included.

Readers of CONTRACTORS AND ENGINEERS MONTHLY can obtain copies of the bulletin on mention of this notice.

New Dowel Assembly Has Reduced Weight

Developed in 1939 by the Electric Welding Co. of McKees Rocks, Pa., the Type J transverse dowel assembly unit for concrete paving has been used on many highway and airport jobs. The unit is of welded construction, and features the use of angular dowels instead of round.

This is said to provide the necessary dowel surface area with less dowel weight, and less weight in the unit itself, amounting to approximately 3 pounds per linear foot. Another feature of the Type J is its latticed frame which serves as a back-up for the expansion joint, or the steel plate when used as a contraction joint. This is designed to eliminate the necessity for bulkhead plates.

The Type J expansion unit is furnished complete with the expansion material, either fiber, asphalt, or cork, punched and ready for assembly, and with the angular dowel caps, and pins. In the contraction unit, the 16-gage steel plate is furnished in place, if required. No dowel caps are needed with the contraction assembly, but pins are furnished. Either crowned or straight units are available.

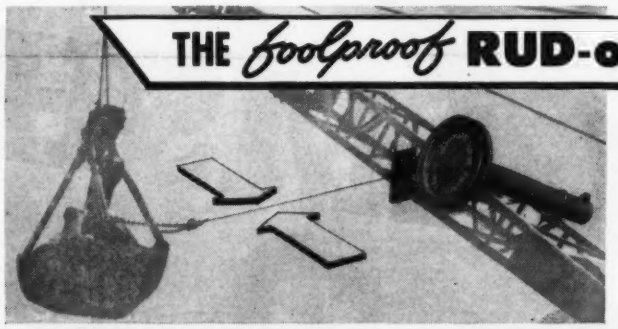
Further details concerning the Type J dowel assembly can be obtained direct from the manufacturer by mentioning this news item.

"We want highways on which it is hard to get hurt", Sidney J. Williams, Assistant to the President of the National Safety Council, asserted recently, pointing out that such improvements as wider pavements, adequate sight distance, and proper lighting are needed.

New B-S Vice President

The promotion of J. F. Harrison, Chief Engineer and Works Manager, to the post of Vice President in charge of engineering and manufacturing, has been announced by the Buffalo-Springfield Roller Co., Springfield, Ohio. A pioneer in many developments in construction equipment during his quarter of a century in the field, Mr. Harrison holds a number of patents. He joined the Buffalo-Springfield organization in 1941.

MEMO TO ALL CONSTRUCTION SUPTS.
For Bigger Payload Performance
...the logical first choice is HAISS HI-POWER. Unique for Sta-in-line reeving, out-of-the-muck sheaving. Weight placed for highest digging power, with closing ratios up to 7:1. Write for facts.
HAISS
GEORGE HAISS MFG. CO., INC., Canal Place & E. 142nd Street, New York 51, N. Y.


THE foolproof RUD-o-MATIC TAGLINE

★ Spring tension keeps bucket steady
★ No weights, tracks or carriages
★ Fewer sheaves saves cable wear
★ Easily installed in 30 minutes
★ Your Equipment Dealer can supply you

"IT'S THE STURDY FOOLPROOF COIL SPRING"

McCAFFREY-RUDDOCK TAGLINE CORPORATION 2121 EAST 25th STREET LOS ANGELES 11, CALIFORNIA

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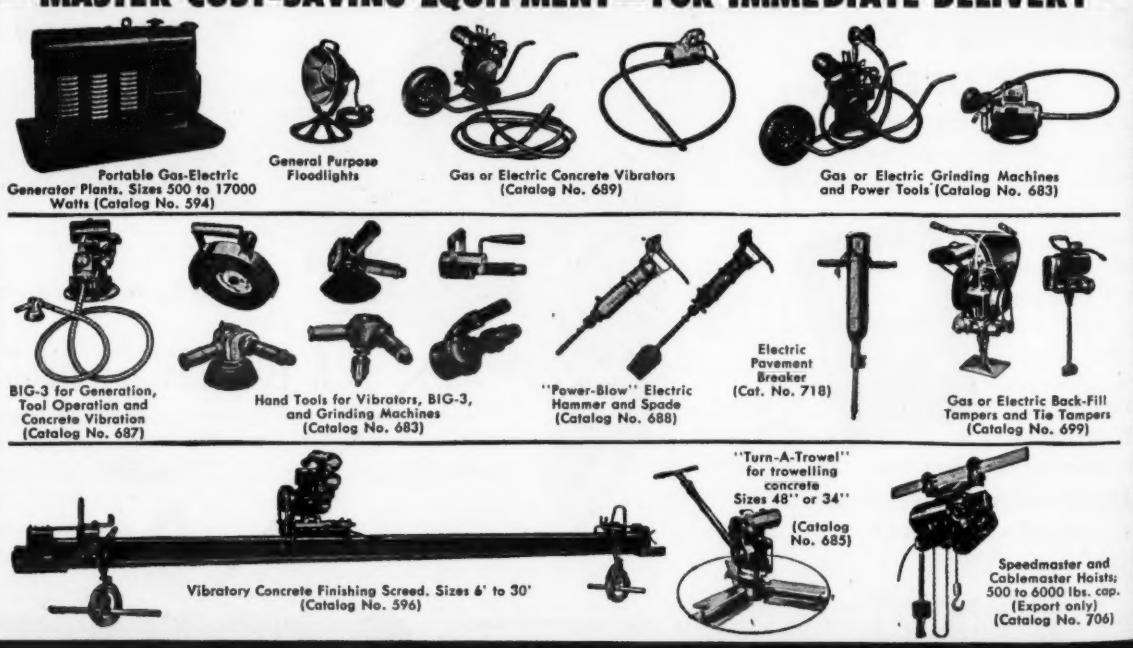
MASTER COST-SAVING EQUIPMENT—FOR IMMEDIATE DELIVERY


Portable Gas-Electric Generator Plants. Sizes 500 to 17000 Watts (Catalog No. 594)
General Purpose Floodlights
Gas or Electric Concrete Vibrators (Catalog No. 689)
Gas or Electric Grinding Machines and Power Tools (Catalog No. 683)
BIG-3 for Generation, Tool Operation and Concrete Vibration (Catalog No. 687)
Hand Tools for Vibrators, BIG-3, and Grinding Machines (Catalog No. 683)
"Power-Blow" Electric Hammer and Spade (Catalog No. 688)
Electric Pavement Breaker (Cat. No. 718)
Gas or Electric Back-Fill Tampers and Tie Tampers (Catalog No. 699)
Vibratory Concrete Finishing Screed. Sizes 6' to 30' (Catalog No. 596)
"Turn-A-Trowel" for trowelling concrete Sizes 48" or 34" (Catalog No. 685)
Speedmaster and Cablemaster Hoists; 500 to 6000 lbs. cap. (Export only) (Catalog No. 706)

CLIP THIS ADVERTISEMENT—CHECK CATALOGS WANTED

Send for illustrated catalog on any item to

MASTER VIBRATOR COMPANY

DAYTON 1, OHIO

New Quarry Provided Rock for Levee Job

(*Continued from page 2*)

tinued until the face was squared up, and then churn drills were used.

Blasting by the coyote drift method breaks the stone out in big chunks, and extensive secondary blasting is necessary. At the lower quarry, three Ingersoll-Rand Model JB-5 Jackhamers were used continuously, drilling shallow holes with 2 to 6-foot steel and 1½ to 2-inch-diameter Timken detachable bits. A 500-cfm semi-portable Sullivan air compressor, mounted on steel skids, was used at the lower quarry to furnish power for jackhammer operations in coyote drifts and on secondary drilling. Air was stored in a steel tank 12 feet 6 inches long with a 4-foot diameter, and dispensed through 500 feet of 2-inch screwed pipe header.

Wagon Drilling at Upper Quarry

About a mile up Lytle Creek Canyon from the location of the first quarry site, the contractors opened up a second rock-producing center. Here rock is not as seamed and broken. Two Ingersoll-Rand X-71 wagon drills and a Gardner-Denver machine were used for drilling. Timken detachable bits were used on steel up to 36 feet long, and the holes were drilled on a 2 per cent downward slant, for lifting effect, on 6-foot centers. Power for these drills was furnished by a Chicago Pneumatic 500-cfm portable, a Sullivan 320-cfm portable, and a Chicago Pneumatic 210-cfm portable air compressor.

Only 6 feet per hour could be made in this hard granite. The 2½-inch-diameter wagon-drill bits dulled or lost their gage in 12 inches of drilling. They were detached, sent in to Los Angeles to the Power Tool & Supply Co. where they were resharpened and oil-tempered. Three sharpenings were all a bit would stand; after that it had to be discarded. Drill bits which had once been 2½ inches in diameter wore down in gage to 1½ inches in three sharpenings.

Wagon-drill holes were sprung three and often four times. The rock had a springing factor of about 6; that is to say 5 sticks of 60 per cent Atlas gelatin dynamite went in for the first springing, then 30 sticks would follow the second time, 2 cases the third, and so on. If more than one hole was sprung at once, Mardes used 1-second delays between each hole to minimize clean-up work. All the loose rock on the face of this cliff jarred off when heavy springing was done so, by multiple springing with delays, he brought down whatever loose rock was bound to fall at once, and cleaned it up by pushing it out of the way with a Caterpillar D8 and bulldozer. After that he was ready to load a battery of holes without having to fight loose rock.

Wagon-drill holes were also loaded on the basis of between ½ and ⅔ pound of dynamite per ton of stone. Sticks of Atlas 40 per cent gelatin, 1½ x 12 inches, were used. Holes were loaded to within 6 feet of the surface, tamped and backfilled with clay, and detonated with Primacord.

Loading and Hauling

At the time the project was started, all rock was handled twice by passing it over a grizzly and then loading it out in trucks for the levees. The grizzly, which had a capacity of 4,000 tons per 16-hour day, was set on the natural slant of the mountainside. The 12 x 15-foot receiving hopper, made from 1-inch steel plate, was set on a 1¼ to 1 slope. The passage of rock across this bed and down over railroad rails set on 6-inch centers was slowed up by lengths of heavy chain, hung downward at 1-foot intervals from a steel beam. This grizzly removed dirt and quarry spalls smaller than 6 inches for the first three months the job was in progress. After that, the overburden was removed sufficiently and handling methods on the levees had improved to the point where no further screening was necessary.

Three Northwest Model 80-D shovels, using Amsco 2½-yard rock buckets, were used for loading the rock. Each shovel took care of ten trucks, ranging from 14 to 35-ton capacity. In addition to these hauling units, one 12-yard Maxi dump truck was assigned to each shovel to haul away whatever refuse and small material developed. These trucks hauled an average distance of a mile, and deposited their loads either in a retaining levee or along a job haul road.

Twenty-five 10-wheel Ford, Chevrolet, and Dodge dump trucks were brought to the job on a ton-mile basis from Updegraf & Nugent. These trucks

(*Concluded on next page, Col. 3*)

What YOU SHOULD KNOW ABOUT

MARKLEY-CARTER
Portable
DUST COLLECTORS
"Collects and Controls"

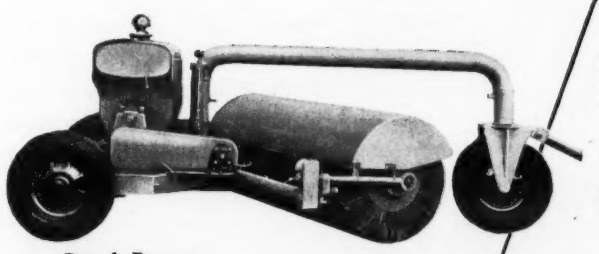
1 Portable units operate through powerful air stream by an effective double separation principle. No dust escapes into the air. Reduces SILICOSIS hazard to safe hygienic limit.
2 When applied to rock drills, SPEEDS UP DRILLING TO 33 PER CENT. Drill steel cuts into fresh rock unimpeded by dust or chips. PROLONGS LIFE OF DRILL STEEL. REDUCES SHARPENING COSTS.
3 Quick detachable hood permits easy inspection of hole and changing drill steel without interference from hood.
4 When applied as industrial unit, collects dust accumulations that are costly and apt to be a hazard both to men and equipment. Keeps your plant, motors and machinery free from harmful dusts.
5 Equipped with Markley-Carter disposal container which permits continuous collection and disposal without closing down the system.

● *Write for Bulletin 4402 which describes in detail the advantages of using* MARKLEY-CARTER DUST COLLECTOR *in your quarry and plant.*

RALPH B. CARTER COMPANY
192 ATLANTIC ST., HACKENSACK, N. J. 53 PARK PL., N. Y. 7, N. Y.

IT'S NOT WHAT YOU LIKE TO DO-BUT WHAT YOU DO THAT COUNTS

"Spray Master"
Pressure Distributor

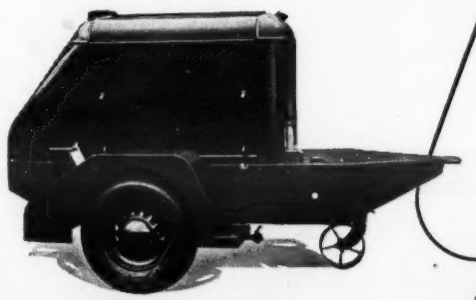


Road Broom

When those big Black Top Road, Highway or Airport Runway jobs are ready for Construction or Repair—do you *like to do* a modern efficient job—or do you *do* a modern efficient job?

If you have the right Equipment, engineered, tested and proven like Littleford "Spray Master" Pressure Distributors, Road Brooms, "Tankar" Steam Heaters, Supply Tanks, then there's no reason for not doing a perfect Black Top Job.

Let's take a look at these Littleford Units and see why they're efficient and modern. The "Spray Master" with Full Circulating Vacuum Flow Spray Bar circulates the material by Vacuum not pressure. Road Brooms have Hydraulic Tension Control on the Brush for adjusting Brush tension on Road surface. "Tankar" Steam Heater produces steam in two minutes' time. Supply Tanks can be built without the use of a frame—known as Littleford Frameless Constructed tanks. It's what you *do* that counts and you can count on Littleford Black Top Road Equipment.



"Tankar"
Steam Heater

Supply Tank

LB BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE · 1900
LITTLEFORD
LITTLEFORD BROS., Inc.
485 E. PEARL ST., CINCINNATI 2, OHIO

The new Owen loader with ½-yard bucket capacity is designed for mounting on standard 1½-ton dump trucks.

Loader-Digger Adds To Dump Truck's Use

The conversion of a standard dump truck into a highly versatile utility unit is made possible by the new Owen loader. This digging and loading attachment is mounted on the front of the dump truck and, through hydraulic control, loads material into the body in one-man one-unit action.

A bucket, suspended by hydraulic rams from an A-frame, digs in front of the truck, raises up over the cab, and deposits the material gently in the dump body in a 30-second loading cycle. The unit neither interferes with normal cab activities, nor does it necessitate a special dump body. The Model A Owen loader is designed for standard 1½-ton trucks, and has a bucket with a ½-yard capacity.

The Owen loader features a special elbow-shoulder movement of the bucket arms for greater leverage and less strain on the chassis of the truck. At no time does the unit interfere with the use of the cab doors. When the truck is traveling, the loader rests back of the cab.

Literature containing more complete details on the Owen loader may be secured from the Marion Machine Co., Marion, N. C.

New Tension Wrench

It is possible to cut equipment maintenance costs through the elimination of the excess wear of moving parts which results from improper bolt and nut tensioning, the Snap-on Tools Corp. says, in announcing the new T-type Torqometer. This tension wrench is designed to take the guesswork out of tightening in operations requiring tensions up to 2,000 foot-pounds.

The Torqometer, which weighs 30 pounds complete, has a 4-inch dial and a pointer which are adjustable to the most readable position. A flash signal lights when the required tension is reached. Usable with a double or single handle as needed, the tool will accept any socket wrench having a 1-inch square drive.

Further details may be obtained by shop men who write the firm at Kenosha, Wis., and mention this description.

Kaiser-Frazer Executive

The appointment of Edgar Kaiser as Vice President and General Manager of the Kaiser-Frazer Corp. has been announced. Eldest son of Henry J. Kaiser, he supervised the building of the Bonneville main-spillway dam on the Columbia while Vice President of the Columbia Construction Co., and the completion of Grand Coulee Dam while holding a like post with Consolidated Builders, Inc.

Chemical Sales Post

The appointment of William L. Platt as Boston sales representative for the Columbia Chemical Division has been announced by the Pittsburgh Plate Glass Co. Mr. Platt has been associated with the company for 16 years.

New Quarry Provided Rock for Levee Job

(*Continued from preceding page*)

hauled about 14 tons of blanket rock, on an average, and were loaded by one of the Northwest shovels in about 4 minutes. Ten custom-built 35-ton Mack end-dump trucks were brought in by Camillo Trucking Service on the same basis, and maintained at their yard near the upper quarry. It took about 8 minutes to load these big units but they maintained a 35-mph hauling speed with the smaller Fords and Chevrolets. Trucks were weighed on a commercial beam scale upstream from the Triangle Rock plant while on their way to the levee.

About a month after the quarry was opened, Lytle Creek tore loose on one of its bad rampages. It filled its bed bank to bank, and washed out part of the haul roads. By working late into the night, the contractors' men managed to walk the shovels and other equipment up to safe ground. The maintenance of Lytle Creek between retaining levees was the major problem of the job since that time, because the rainy season has been in progress. A Caterpillar D8 tractor with bulldozer has been used full time on this work.

Equipment and Personnel

Other equipment on the job included a Waukesha-powered 10-kw Kohler light plant and a Le Roi-powered Marble-Card 10-kw generator, which were used when the quarry operated 16 hours a day. A Caterpillar D8 with bulldozer cleaned up around the shovels, and traveled up to the wagon drills to clean up there when necessary. All Winston Bros.' equipment was maintained by a truck-mounted Alemite and fueling unit which made the rounds once every 8 hours.

At the time the job was visited, 200,000 tons had been quarried at a production rate of 2,000 tons per 8-hour shift. G. G. McAfee was Quarry Superintendent for the contractor.

6 FEET WIDE . . . 2 BUCKET LINES

310 PARSONS TRENCHLINER

Parsons 310 Trenchliner easily handles 2 bucket lines, digs efficiently up to 72" wide. Digs box sewers without shuttling. With 2 booms of varying lengths, it digs a step trench for simultaneous installations of water, gas or sewer lines in one ditch. The wide discharge chute, big engine and large capacity conveyor will handle the extra load economically.

WRITE FOR YOUR CATALOG TODAY!

PARSONS COMPANY

KOEHRING SUBSIDIARY NEWTON, IOWA

TRENCHING EQUIPMENT

"Even When Wood IS Available...We'll Stick With STERLING'S TUBULAR FRAME"

FORTIFIED FOR TOUGH USE AT POINTS OF STRESS . . .

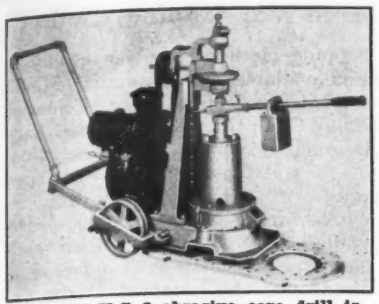
While wood remains on the "wanted" list, STERLING'S reinforced Tubular Steel Frame becomes more and more widely accepted among users as the most substantial material for barrows. The Tubular Frame can "take it" under all conditions, in all weather. In every way, it lives up to the well-known STERLING quality. When wheelbarrows are again available for prompt shipment, be sure to specify STERLING'S Tubular Frame.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A 4966-⅓



The new H-S 6 abrasive core drill is designed for taking test cores from concrete slabs as well as for a variety of other drilling jobs.

New Core Drill Cuts Reinforced Concrete

Taking test cores in new concrete construction and other drilling tasks are performed by the H-S 6 abrasive core drill made by Howe-Simpson, Inc. In addition to drilling through reinforced concrete, the H-S 6 may be used to penetrate stone, granite, and other substances.

Operating at 500 rpm, the steel-tube drill bit on the H-S 6 is capable of drilling a 6¾-inch hole in an 8-inch reinforced-concrete slab in 15 to 20 minutes, Howe-Simpson reports. Powered by either electric motor or gasoline engine, the drill is set on a template over the spot to be drilled, water and abrasive are poured in, and drilling begun. A mixture of steel shot and steel grit serves as the abrasive. The template has a rubber under-face designed to absorb vibrations as it rests under the machine.

The H-S 6 is 50 inches high, 54 inches long, and 24 inches wide, and weighs 450 pounds. The unit has an automatic clutch for starting and a weighted pressure arm. Drill bits are made in six sizes ranging from 3½ to 6⅝ inches outside diameter. Drill-hole diameters average ⅛ to 3/16-inch larger than the bit, and the core about ¾ inch smaller. The drill bits are 17 inches long, and the unit has an extension shaft which permits drilling to 30-inch depth. Extra equipment includes a special lift truck for moving and spotting the machine.

More complete details can be obtained by addressing Howe-Simpson, Inc., 136 E. Gay St., Columbus 15, Ohio. Mention this news report.

Torsional Suspension Is Feature of Trailers

The application of the principle of gravity torsion bar suspension in place of traditional spring suspension on heavy-duty trailers has been announced by the Fruehauf Trailer Co. This new departure is to be featured as standard equipment on the entire line of Fruehauf tandem-axle units.

Gravity tandem suspension is said to provide a cushion mounting for the trailer body and load, permitting them to ride a level course regardless of the movement of the axles or wheels. This means that the unit will remain relatively level, even when operated on extremely uneven road surfaces. In addition, the geometry of the shackle construction is such as to load the torsion bar springs in proportion to deflections, as well as to limit the maximum load transferred to the spring system. Road shocks are cushioned vertically and laterally, and true tracking is said to be assured all forward travel, with the result that tire life is increased.

The gravity suspension tandem operates on the basic principle of leverage, with the axles having freedom of movement completely independent of the frame and body. The new tandem has a net payload capacity of 33,000 pounds. There is no appreciable weight difference between new models and comparable units having standard suspensions. The torsion bar can be readily reset for special operating conditions.

Complete details on this new suspension principle in Fruehauf trailers can be obtained by writing the firm at 10928 Harper Ave., Detroit 32, Mich.

Highway Safety Meeting Sponsored by President

Organizing to combat the increase in highway accidents since the relaxation of wartime restrictions, the President's Highway Safety Conference is to convene at Washington, May 8-10. Major General Philip B. Fleming, Federal Works Administrator, is General Chairman of the Conference, and Thomas H. MacDonald, Commissioner of the Public Roads Administration, Chairman of the Coordinating Committee. Among the members of the committee is M. J. Hoffmann, President of the American Association of State Highway Officials.

Designed to stimulate a nation-wide program for reducing traffic accidents, the Conference will include representatives of Congress, the governors of the states, officials of national, state, and local governments directly interested in the work, police officials, representatives of labor and industry, organizations active in safety, and others. Special committees are to present to the Conference recommendations on accident reporting, law enforcement, engineering, law and ordinances, driver licensing, education, public information, and public support.

Wernisch Gets Ceco Post

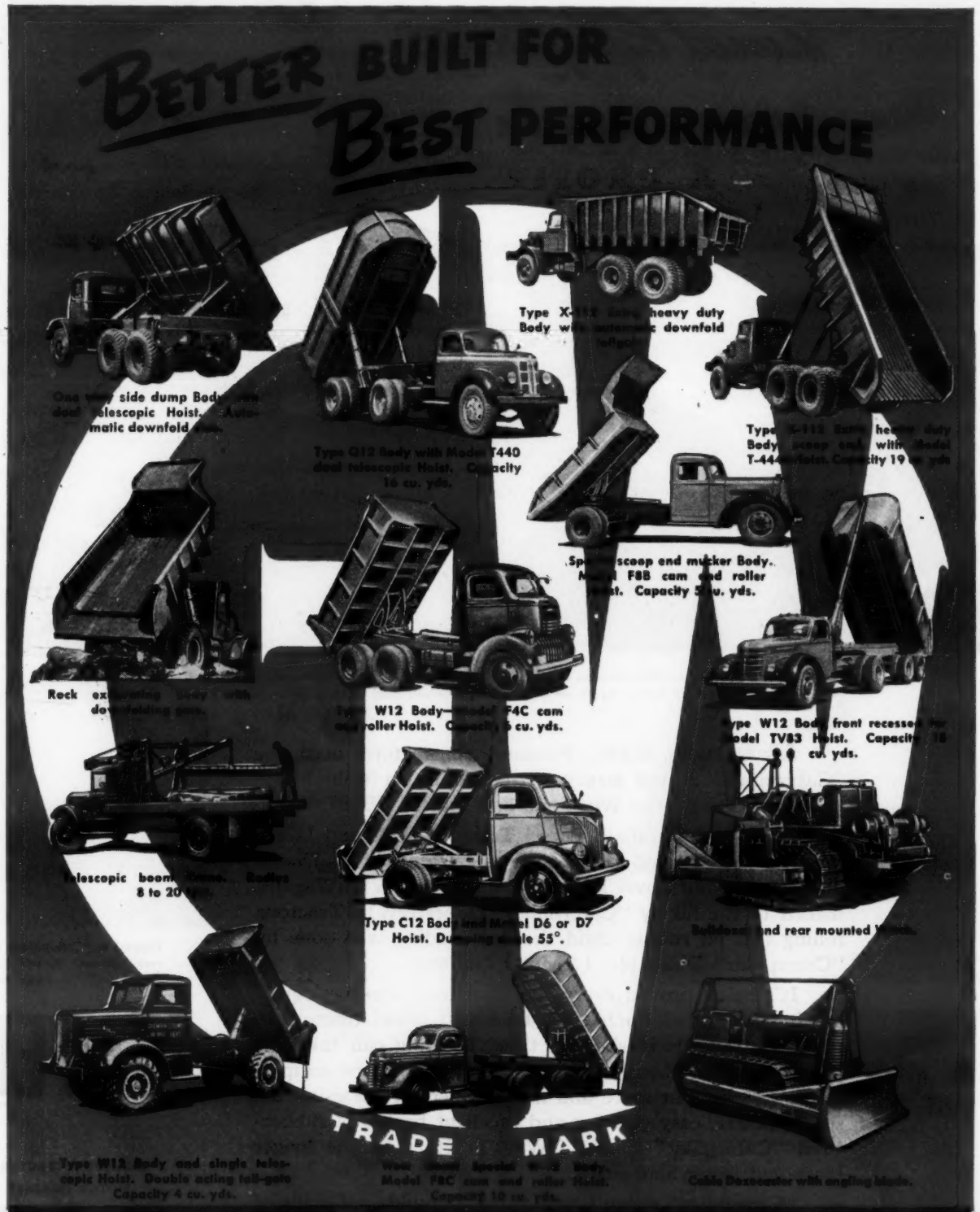
The appointment of George R. Wernisch as Assistant Manager of the Concrete Engineering Division has been announced by the Ceco Steel Products Corp., Chicago. Mr. Wernisch has returned to Ceco from 2¼ years in the steel section of the Bureau of Yards and Docks, U. S. Navy, where he held the rank of Lieutenant Commander.

SPEED OPERATION for Snow Plows and Road Machinery with the . . . .

MONARCH New and Improved HY-LO-JACK Power Hydraulic Control

Lifts plows ten times faster than hand pump.
Fan-belt driven by truck engine. Cab-controlled.
Easy installation on new or existing equipment.
Priced for the most conservative budget.

MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N. W., Grand Rapids 4, Michigan


BETTER BUILT FOR BEST PERFORMANCE
Type Q12 Body with Model T440 dual telescopic Hoist. Capacity 16 cu. yds.
Type W12 Body—Model F4C cam and roller Hoist.
Type C12 Body and Model D6 or D7 Hoist.
TRADE MARK

GW TRADE MARK

GAR WOOD INDUSTRIES, INC.

7924 RIOPELLE ST. • DETROIT 11, MICH.

WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT

OTHER PRODUCTS: TANKS • HEATING EQUIPMENT • MOTOR BOATS

Fast-Healing Paint Cuts Tree Mortality

Of interest to roadside development men is a product developed by the A. C. Horn Co., 43-36 Tenth St., Long Island City 1, N. Y., for the protection of tree wounds and the reduction of tree mortality. The development, a tree paint, is reported to reduce the healing time of tree injuries by about one-third. This Horn paint, made of plasticized asphalts, resin and lanolin, and fungicidal preventives consisting of pinene, bornyl acetate, and sylvestrenes, is said to have high adhesion in addition to its other qualities.

A folder devoted to a discussion of tree healing factors and more complete details on the Horn tree paint can be secured direct from the company on mention of this notice.

Ohio Names Col. McKee

Colonel Charles McKee, retiring from the Fifth Service Command, has been named Chief Engineer of the Bureau of Location and Design, Ohio Department of Highways. He was with the Department from 1925 until 1939, when he joined the WPA state office. He later entered the Army Engineers, and was recently awarded the Legion of Merit for his services.

Electric Units Shown

A preview of its new products, some of them developed during the war years, is given by the Motor Generator Corp. in a new brochure. A division of Hobart Brothers Co., the firm offers a wide range of electric generators, battery chargers, and other items. The Bulletin, folder DM-704, can be secured on request to the Division, at Troy, Ohio. Mention this notice.

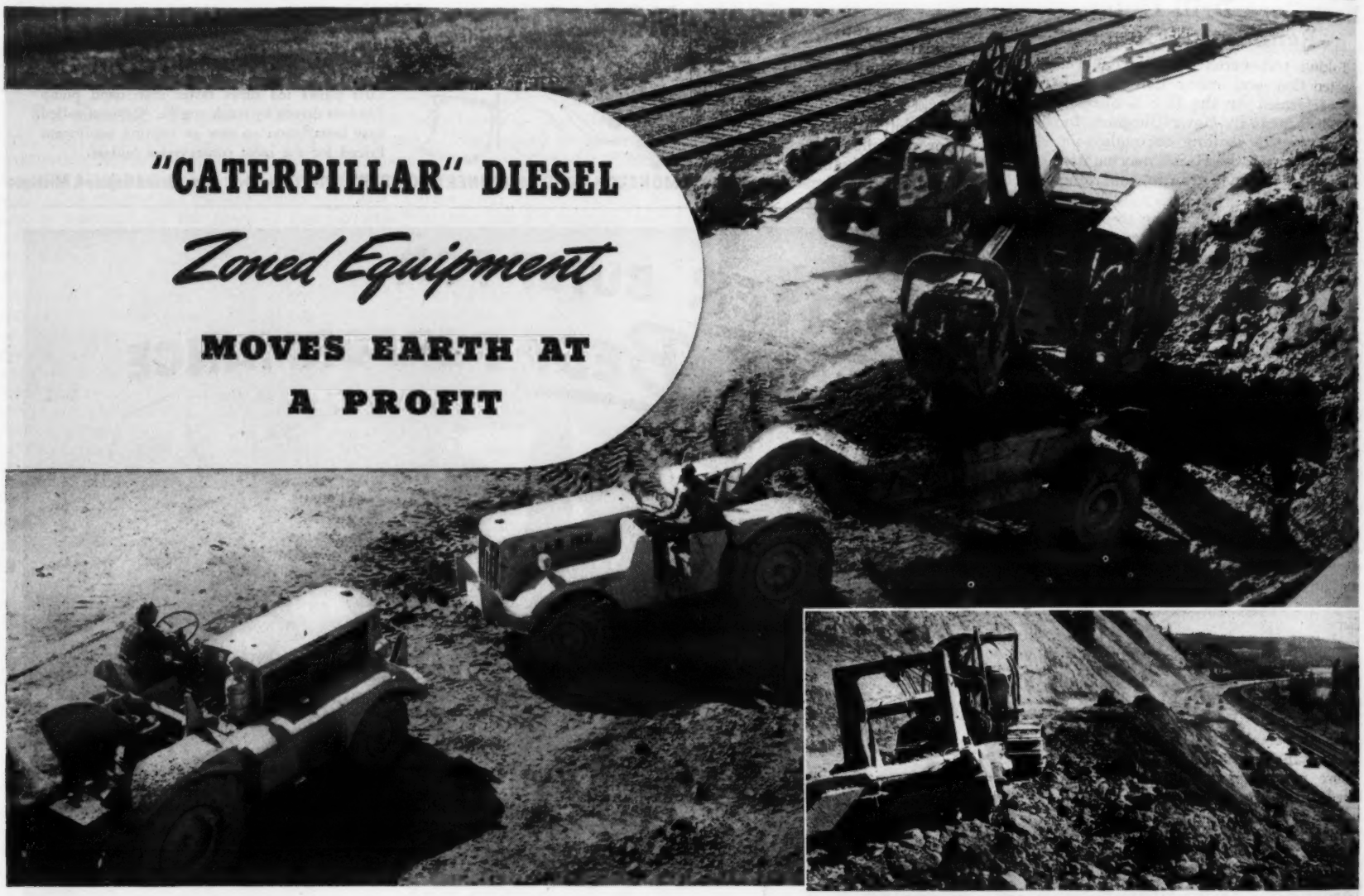
Pre-War Wiping Cloths

Wiping cloth of pre-war quality is again available, with the easing of Government restrictions, the Columbia Wiping Cloth Co., has announced. Soft, absorbent wipers for machinery, oil, grease, and general use, which have been very scarce during the war, can now be supplied in 200 and 400-pound bundles. Washed and sterilized, each cloth is packed flat. Trial orders of 50 pounds may be obtained. Write the Columbia Wiping Cloth Co., 1720 Wabash Ave., Kansas City 1, Mo., and mention this notice.

"CATERPILLAR" DIESEL

Zoned Equipment

MOVES EARTH AT A PROFIT



"Caterpillar" Diesel DW10 Tractors and W10 Wagons being loaded by a "Caterpillar" Diesel-powered Lorain shovel, on the Woodland-Martin's Bluff highway job.

LEONARD & SLATE, Portland contractors, used the "Caterpillar" *zoned equipment* system on a highway-widening job between Woodland and Martin's Bluff, Wash.

Husky "Caterpillar" Diesel Tractors—D8s and D7s—did the ripping and bulldozing. A "Caterpillar" Diesel-powered Lorain shovel loaded "Caterpillar" W10 Wagons, hauled to the fill by "Caterpillar" Diesel DW10 Tractors, rolling fast on rubber. And the fine grading was done by "Caterpillar" Diesel No. 12 Motor Graders.

It's being proved every day that most modern earth-moving jobs need *both* track-type and wheel tractors to move most yards in shortest time. Nothing can take the place of the D8 when it comes to tough 'dozing and scraper-loading work. But more and more owners are praising the speed, power, easy steering and excellent brakes of rubber-tired "Caterpillar" Diesel DW10 Tractors on the longer hauls and faster haul roads.

"Caterpillar" doesn't take sides. It builds *all* kinds of earthmoving machines—with typical "Caterpillar" quality—to do the job at LOWEST COSTS ON EARTH.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

(Upper) A "Caterpillar" Diesel D8 Tractor pulls ripper through rocky ground. (Lower) Fine grading is done by a "Caterpillar" Diesel No. 12 Motor Grader.

CATERPILLAR

REG. U.S. PAT. OFF.

ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

DIESEL

THE DISCHARGED VETERAN WEARS THIS EMBLEM. REMEMBER HIS SERVICE AND HONOR HIM.

The latest addition to the Le Roi line is a combination 105-cfm air compressor and a 35-hp wheel tractor.

Tractor-Compressor Built in One Unit

Its latest achievement in 23 years of making portable air compressors has been announced by the Le Roi Co., 1726 N. 68th St., Milwaukee 14, Wis. The unit, called the Tractair, comprises a 105-cfm air compressor combined as an integral part of a 35-hp wheel tractor. The air-power unit is entirely new, incorporating the latest industrial-engine design developments, the firm says. It has 6 cylinders, a cylinder block in one casting, hardened removable wet cylinder sleeves, and precision shell-type bearings.

The tractor unit for the Tractair is a Le Roi-Centaur. Mounted on four pneumatic tires, it has a 5-speed transmission. There is enough power surplus in the engine to permit the Tractair's use as a tractor while maintaining a full head of compressed air. Numerous front and rear pneumatic, hydraulic, and mechanical attachments are available to enhance further the versatility of the new unit.

Complete details concerning the Tractair can be obtained by writing to the manufacturer.

Gen. Schley New President Of ARBA Airport Division

Reorganized last autumn, the Airport Division of the American Road Builders' Association is making rapid progress, under the direction of Walter R. Macatee, Manager. The recently elected officers for 1946 include Major Gen. Julian L. Schley, Executive Director of the Baltimore City Aviation Commission, as President. Its Vice Presidents are William E. Cullinan, Director of the New York State Bureau of Aviation; Dexter C. Martin, Director of Aeronautics for the South Carolina Aeronautics Commission; L. L. Schroeder, Minnesota Commissioner of Aeronautics; and O. J. Porter, Engineer in the Materials and Research Section of the California Division of Highways, and a member of the Board of Consultants on airfield pavements, Office of Chief of Engineers.

Salt as Culvert Cleaner

The problem of frozen culverts has been solved in novel fashion by one state, which hit upon a simple time-saving idea. A small bag of rock salt is placed in the stream leading to the culvert. The bag keeps the salt from washing away, and as it dissolves, the brine thaws out the frozen pipe. The amount of salt used in such operations varies with the size and condition of the culvert. It is reported that usually only a small quantity is required to do a thorough ice-removal job.

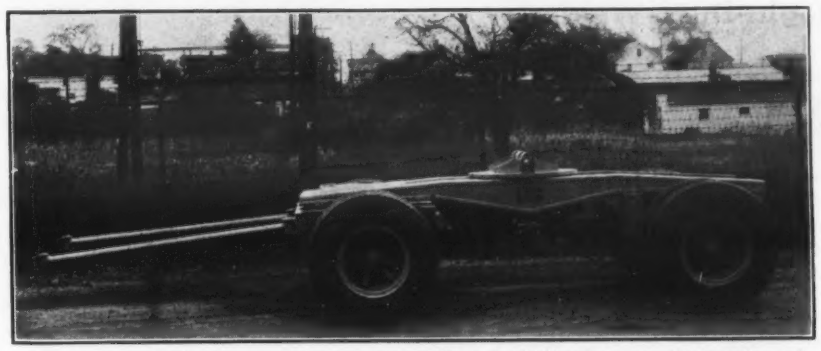
Link-Belt District Mgr.

Following the resignation of Max Giffey after 40 years of service, the Link-Belt Co., Chicago, Ill., has appointed Arthur J. Olson as Sales Manager for the Kansas City District. Former District Sales Engineer at Chicago, Mr. Olson has been with Link-Belt since 1918. He will be assisted by J. Arthur Townsend and Leroy C. Rathsam.

New Undercarriage For Semi-Trailers

Contractors have many hauling problems in handling materials for their own jobs. Bringing in piles, reinforcing and structural steel, big tank loads of bituminous materials, etc., requires care and sometimes special equipment. The new Hoobler undercarriage recently announced by Union Metal Mfg. Co., Canton, Ohio, is a mechanical device permitting tracking of the semi-trailer without any assistance from the driver.

Attached under the platform of a semi-trailer, this undercarriage operates entirely automatically. Equipped with the Hoobler undercarriage, 30 to 40-foot loads, tank trailers, etc., can readily make a right-angle turn from one 15-foot street into another 15-foot street without any of the tires touching either curb, as all wheels track. This makes for easier driving, greater stability of loads, reduction in the amount of power required, and greater safety on the road.



The new Hoobler undercarriage for semi-trailers is designed to permit tracking of a semi-trailer without assistance from the driver.

Full information may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Athey Executives

The appointment of E. T. Tuller as Domestic Sales Manager for the Athey Products Corp., Chicago, Ill., has been announced by D. F. Hipskind, Vice President in charge of sales. Joining the firm in 1940, Mr. Tuller became District Representative in charge of the Central Sales Division in 1943.

A. T. Marchuk, associated with the firm since 1936, has been named Production Manager by Athey. He has served the organization in various traffic and production posts.

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YAUN'S Basket-Type BUCKET

Handles any material, including sand, that can be moved by the conventional type bucket . . . at least 1/3 lighter than usual bucket of same capacity . . . dumps sticky material 100% clean with no suction . . . built for long life.

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"More YARDAGE With a YAUN"

Light-Duty Welder For Repair Jobs

A new small portable electric welder, the Zipper-Et, has been announced by the Mid-States Equipment Corp. for light-duty welding and general maintenance work. The machine is patterned after its bigger relatives in the Zipper family, and operates as much like them as possible, within its limitations, the firm says.

Weighing but 40 pounds, the Zipper-Et operates on 110-volt ac current. It can handle five sizes of welding rod, from 1/32-inch through 3/32-inch, and ¼-inch carbon. A 9000 arc torch is standard equipment. The entire unit, with accessories, is built into a sturdy carrying case.

The case holds a burn-out-proof transformer which has spun-glass insulation. This transformer also has separate primary and secondary windings, without any electrical connection between them. An approved helmet leads the list of accessories supplied with the set.

The Zipper-Et is a new easily portable electric welder suitable for equipment-repair jobs.

Shipments of the Zipper-Et can be made from stock. Write the Mid-States Equipment Co., 2429 So. Michigan Ave., Chicago 16, Ill., for further details, and mention this news item.

Help to fight Public Enemy No. 1—cancer—by contributing to the campaign of the American Cancer Society, 350 Fifth Avenue, New York 1, N. Y.

Scott Joins Jack Firm

Released from duty with the Naval Air Corps, Eugene T. Scott has joined Templeton, Kenly & Co., Chicago, manufacturer of Simplex jacks. Serving as product application engineer, he will range the country in his sales and engineering duties. Mr. Scott was formerly with the National Aluminate Co. and the Chicago Screw Co.

Blaw-Knox Dealers

Blaw-Knox construction equipment is to be handled in Ohio by the Ohio Machinery Co., and in the Los Angeles region of California by the Shaw Sales & Service Co., the Blaw-Knox Co., Pittsburgh, Pa., has announced. The Ohio firm has offices in Columbus, Cleveland, and Toledo.

Concrete Densifier Data

The features of Plastiment, a concrete densifier produced by the Sika Chemical Corp., are outlined in a recently issued 8-page guide to its use. The booklet describes how the powder works when mixed in the concrete, and explains its effect on workability, bleeding, hardening, heat development, uniformity, cold joints, bond, shrinkage, surface hardness, strength, resistance to freezing, and impermeability.

Copies of the booklet, "Plastiment, the Concrete Densifier", can be obtained on mention of this notice. Write the Sika Chemical Corp., Passaic, N. J.

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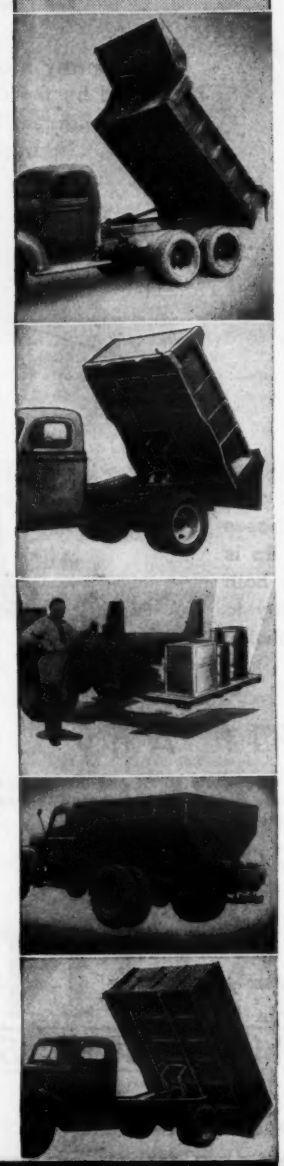

- ANTHONY "SUPER" HYDRAULIC HOISTS AND BODIES, up to 30 ton capacity — with "power speed lift" and "rubber restraining blocks," two of many features that explain the evident preference for Anthony equipment on the job.
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- ANTHONY MATERIAL SPREADER . . . rugged, all steel; for road building, maintenance and ice control.
- ANTHONY HYDRAULIC PLATFORM "BOOSTER" HOISTS, especially designed to make dump bodies out of flat bed trucks.

Write for complete details on any Anthony product. Available through all truck dealers and Anthony distributors.

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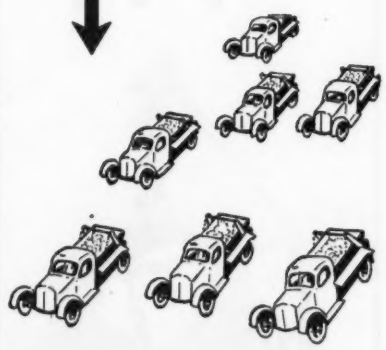

This unit increases truck efficiency and provides a fast, economical method of handling materials in quarry work, earth moving, and general construction jobs requiring hand labor in loading.

One Load Lugger installed on your standard truck chassis, working with 5 to 10 detachable dump buckets, is the accepted modern method that will save time, conserve man-power and reduce your costs.

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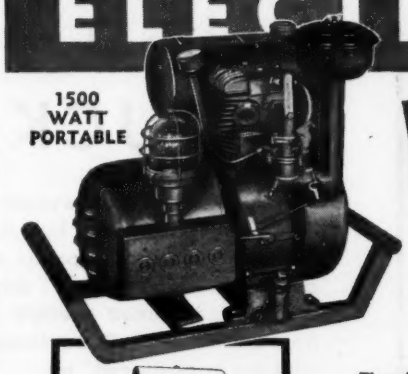

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Methods of Halting Scaling of Concrete

Air-Entraining Materials With Proper Construction Practice Result in More Durable Concrete Roads

By CHARLES M. ZIEGLER, Commissioner, Michigan State Highway Department

✦ ONE form of concrete-pavement deterioration prevalent in Michigan and other states with a similar climate is that due to surface scaling and subsequent disintegration from the surface downwards. This condition has become more serious with the increased use of chemical salts for ice removal. The unsightliness and roughness of scaled areas, the necessary subsequent maintenance, and the added possibility of further deterioration have been of vital concern to highway engineers for years and the subject of considerable research. This problem has led, within the past decade, to a concerted program of research, the most significant result of which has been the discovery of the principle of air entrainment, and the application of this principle to construction practice for the purpose of creating more durable concrete pavements. Investigations have demonstrated that concrete having excellent durability and high scale-resistance can be produced by introducing into the concrete mixture a definite quantity of air in excess of that normally found in ordinary concrete. The resulting product is commonly referred to as air-entrained concrete.

The principle of air entrainment in concrete consists of the incorporation into the concrete mixture of proper amounts of minute uniformly distributed but disconnected air bubbles. Freshly mixed concrete containing entrained air is more plastic, possesses better workability, and can be handled with less segregation than ordinary concrete. The hardened concrete has excellent durability with respect to freezing and thawing action and remarkable resistance to scaling caused by the chloride salts used in ice control. Furthermore, surface water or bleeding of the concrete during placing is practically eliminated, thus greatly reducing the time interval between mixing and finishing operations.

For each percentage increase, however, in the amount of air above the amount which exists in ordinary concrete there will be a reduction in flexural strength of 2 to 3 per cent and in compressive strength of 3 to 4 per cent. The strength decreases in proportion to the increase in air content. It is generally accepted that satisfactory scale-resistance and durability can be obtained without serious loss in strength if the total air content is maintained between 3 and 5 per cent by volume, computed on the basis of the theoretical weight of air-free concrete of the same proportions. The air content of ordinary concrete is normally around 1 to 1.5 per cent.

Air-Entraining Materials

The air-entraining materials which have been investigated and tried experimentally in varying amounts may be grouped functionally into three general classes: (1) organic compounds whose inherent foaming action is independent of any subsequent chemical reaction with the cement; (2) other organic compounds which, when added to the cement, react with the alkalis present to produce foaming agents; and (3) gas-generating agents. Some of these compounds may be either interground with the cement or added to the batch at the mixer, while others are of necessity restricted to only one of these two methods of incorporating the air-entraining agent in the concrete mixture.

The first group includes the sodium compounds of certain organic acids found in fats, oils, and resins and the sodium salts of various sulphated or sulphonated organic compounds. These compounds are soapy in nature and rely for their effect on their property of weakening the surface tension of water to cause foaming.

The materials found in the second group are not in themselves air-entraining agents. In order to cause foaming, they must be converted to the respective water-soluble soaps through their reaction with the hydroxides of the alkali metals present in the cement. Examples of this type are rosins and the various animal and vegetable fats and oils. Air-entraining agents of the first group in general give more consistent and uniform results than those of the second, and their effect is influenced less by the length of mixing time, since the soap-forming reaction progresses as mixing continues. Both of the above groups of air-entraining materials serve to entrap air as such in the mix.

Materials of the third group do not entrap air, but generate gas, usually hydrogen or oxygen, within the mix by the action of inorganic elements or compounds on certain constituents of the cement. The commonest examples of this type are aluminum powder and hydrogen peroxide. The gases so formed seem to accomplish the same purpose as entrained air in promoting durability. There are many other materials available which have the property of entraining air in concrete and may prove satisfactory if properly used.

The blending of plain portland cement with a natural cement which contains an interground air-entraining agent will produce a satisfactory air-entrained concrete. The blending is usually performed on the basis of one part natural cement to five parts portland cement.

The introduction of added air into a concrete mixture necessitates changes in mix design and careful control of production if optimum results are to be achieved. For instance, in a given mix, air entrainment will be influenced by the water content, the effect being more pronounced in lean mixes than in rich ones. The amount, character, and grading of both fine and coarse aggregate, the individual properties and amount of cement used, mixing time, method of mixing, and amount and type of air-entraining agent all affect to varying degrees the quantity of air taken into the mix. More supervision is required than when working with ordinary concrete in order to produce a uniform concrete mixture meeting

(*Continued on next page*)

Contractors and Fleet Operators from Coast to Coast find the extra performance qualities of GATKE *CUSTOM-BILT* Brake Blocks important aids to efficient and economical operation.

The smooth, non-grabbing action reduces strain on equipment and adds countless miles to tire life.

Dependable stopping power under all service conditions means Extra Safety for men and equipment.

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- Self-feeding—no helper required. Safer!

SELF-FEEDING FLINK

Illustration above shows new safety housing now used on Flink WD31 and HD4. Model WD31 is chain driven from rear wheel. Model HD4 has a hydraulic drive. Both controlled from cab. Illustration right: safety cover removed.

THE FLINK COMPANY, Dept. 4 Streator, Ill.

Methods of Halting Scaling of Concrete

(*Continued from preceding page*)

specified design requirements.

The question of a choice between the use of an air-entraining cement or an air-entraining admixture at the mixer will depend almost entirely on how the engineer wishes to control the work. Each method has its advantages and disadvantages. In either case, proper control methods must be provided to insure a satisfactory end product at the mixer.

Design and Characteristics

Methods of adjusting proportions of the mix vary among different users. Features common to all, however, are reduction in water and sand content. Other adjustments are possible under certain conditions, and no hard and fast rule can be applied. Mortar tests alone cannot be depended upon to give an accurate indication of the amount of air which will be entrapped in the finished concrete. The air content of a given concrete mix can be determined only on the basis of actual trials with all of the materials to be used.

The introduction of well distributed minute air bubbles into a concrete mix apparently decreases the particle interference of the aggregates, thereby greatly improving the workability of the treated concrete over that of normal concrete with the same aggregates and proportions. The resulting mixture has an extremely fatty appearance similar to that of an over-sanded mixture. Segregation and bleeding are practically eliminated. As a result there is little free water on the surface to facilitate finishing operations and it is therefore imperative that these operations be started and completed with a minimum of delay or else drying of the surface will hinder proper finishing. Extreme fluctuations in temperature, relative humidity, or wind velocity will influence the finishing characteristics of air-entrained concrete.

Construction Practice

Air-entrained concrete is inherently more sticky than ordinary concrete. Consequently, steel-shod floats and finishing tools have proved better than wooden ones. In some cases it may even be necessary to adjust the transverse oscillations of the screed to its forward motion to prevent torn surfaces.

Caution must be exercised in handling air-entraining cements during batching operations. These cements have a greater tendency to flow in the dry state than normal portland cements and special precautions should be taken to prevent batch losses due to leakage through cracks and openings of any kind. Handling and proportioning of the aggregates at the batching plant should be conducted in such a manner as not to alter too greatly their original grading characteristics and batch weights. The water content of the mixture greatly influences the amount of entrained air and therefore must be carefully controlled within narrow limits. Since the time of mixing is generally fixed ,there remain the speed of rotation, the mixing characteristics, and the physical condition of the mixer drum to influence the properties of the mixed concrete. All of these factors may be successfully controlled on any project by rigid inspection and proper specifications based upon experience and research.

Calcium chloride in amounts up to 2 per cent have been added successfully to air-entrained concrete to facilitate paving operations during periods of low air temperatures. Laboratory tests indicate that calcium chloride in amounts up to 2 per cent, when added to the batch, either in solution or dry form, increases early strength, without decreasing the effectiveness of the air-entraining material in entraining air and in providing a high degree of resistance to scaling and to disintegration caused by freezing and thawing action.

Used in Michigan

Michigan has been using air-entrained concrete for the past five years as a method to eliminate scaling. A portion of the Michigan Test Road, constructed in 1940, was devoted entirely to a study of the problem of scaling and methods for its control. Factors in the investigation to receive major consideration in relation to scaling were the addition of mineral fillers to supplement the fines in the aggregates, proprietary admixtures, air-entraining materials, natural cements with and without air-entraining materials, and finishing and curing methods. Subsequent durability studies revealed that by using air-entraining materials it was possible to obtain a concrete surface practically 100 per cent scale-resistant to chloride salts.

Air-entrained concrete poured during the summer construction season may

(*Continued on next page*)

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Methods of Halting Scaling of Concrete

(Continued from preceding page)

be safely treated with sodium or calcium chloride for ice control the following winter. Attention is called, however, to the damage that will result if air-entrained concrete poured during the autumn is treated in the following winter. This concrete will not be scale-resistant until the second winter after construction.

The reduction in strength of the air-entrained concrete as compared to the standard concrete was approximately 15 to 20 per cent. This marked difference in strength values on the Test Road may be attributed to the high air content required in the concrete and lack of basic information in the design, control, and handling of air-entrained concrete at that time.

Accelerated-Scaling Studies

The scale-resistance properties of the respective concrete sections were subsequently evaluated by a series of accelerated scaling studies conducted during the winters of 1940-1941 and 1941-42.

To accelerate the scaling action of chloride salts, test panels 3 feet wide and 12 feet long were located at selected spots on each concrete surface embodying the special feature under consideration. Water was applied to the test area ¼ inch deep and allowed to freeze over night. The following morning the ice was melted by distributing calcium chloride over the area at the rate of 5 pounds per area. When the ice was disintegrated, the slush was removed and the surface flushed. Fresh water was again applied to the test area and the freezing and thawing cycle repeated. At the end of each freezing and thawing cycle the amount of scale developed during the cycle was determined by superimposing over the test area a grid mesh with 12-inch openings. Weather conditions permitted a complete freezing and thawing cycle practically every day throughout the duration of the tests. The air-entrained concretes containing Orvus or Vinsol resin did not scale under these tests, which were considered much more severe than would be experienced from normal deicing operations.

Durability Studies

Additional freezing and thawing tests on core specimens obtained from the several concrete-pavement sections containing air-entraining materials were performed in the laboratory.

At the time of the test the core specimens were 21 months old. The cores were frozen and thawed in water each day until complete disintegration had taken place. With few exceptions the cores from the air-entrained concrete had considerably greater resistance to freezing and thawing action than those taken from ordinary concrete. The air-entrained concrete also resisted deterioration equally at top and bottom of the core, whereas the ordinary concrete was considerably weaker at the top than at the bottom. The latter phenomenon has for a long time been known to exist in normal concrete pavements. Apparently this inherent weakness can be corrected by the use of air-entraining materials.

Limestone Aggregates

Further experimentation was carried on, using air-entraining materials with limestone aggregates, and the results indicated a reduction in the objectionable characteristics of stone sand in concrete, such as bleeding, poor workability, difficult finishing, and excessive scaling. Orvus was used as the air-entraining material and was added at the mixer in specified amounts of approximately 0.05 pound per barrel of cement throughout the entire project. In part of the project, mineral filler was used in addition to the air-entraining material. Beam tests indicated that the concrete in all cases was up to specification requirements both for the 7-day and 28-day periods.

This pavement was also subjected to accelerated scaling tests. At the completion of 66 cycles of freezing and thawing, there was no indication of scaling in either section. A recent inspection, in 1945, revealed that no surface scaling had taken place.

Old-Road Study

Michigan has a large volume of truck and passenger traffic during the winter months, making it imperative to eliminate quickly the slippery condition caused by ice and snow on the roads, and the question arose at what minimum age could concrete pavement constructed without air-entraining agents be treated with rock salt. Accelerated

(Concluded on next page)

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Reversible transmission on both the feed roller and agitator permits changing from forward to reverse motion, or vice versa, by simply shifting a lever.

The Swivel-type Adjustable Hitch allows the traction wheels of the Spreader to be on the ground at all times regardless of what position the truck or spreader is in. Easily coupled and uncoupled.

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The volume of concrete to be poured in the next five years is anyone's guess . . . and chances are most guesses will be too low. From the profit standpoint, speed and continuous trouble-free service will count . . . that's why a WICO magneto is used on these Jaeger 4 yard High Dump Truck Mixers just as they are on other contractors' equipment where rugged built-in stamina counts.

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More than a thousand authorized service stations are conveniently located for WICO service and replacement of other ignition. Wico Electric Company, West Springfield, Massachusetts.

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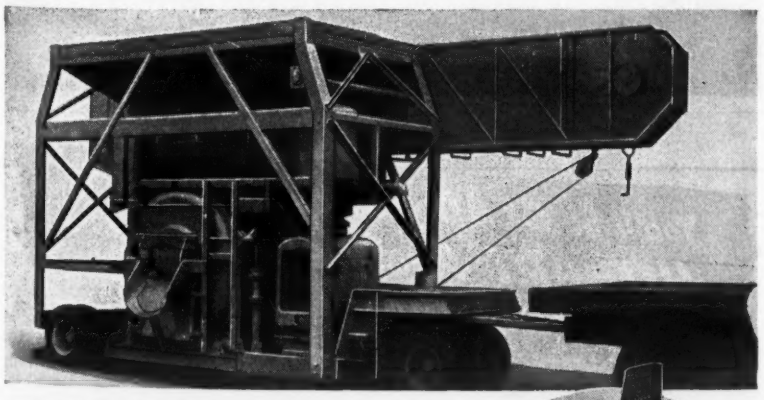

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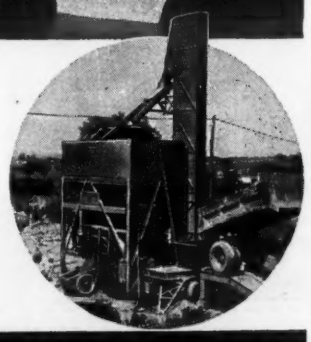

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Methods of Halting Scaling of Concrete

(Continued from preceding page)

scaling tests were run on plain-concrete pavement over an age range of four to nine years. Pavements older than six years were not affected. This resistance of the older pavements to scaling is considered to be due primarily to the gradual continuation of the hydration process of the cement, and to the formation of a strong impermeable carbonate skin through the reaction of lime compounds in the set cement with atmospheric carbon dioxide. Other external factors such as deposition of oil films from crankcase drippings may contribute somewhat to the improved salt resistance of concrete pavements with age.

Michigan now permits the use of flake calcium chloride and rock salt for ice removal on all concrete-pavement surfaces that are 10 years old or more. The 10-year age limit was chosen to provide a safety factor because the tests did not cover all the combinations of aggregates and cements that have been used.

Conclusions

On the basis of the encouraging results obtained from the various test projects, the Michigan State Highway Department authorized in 1941 the use of air-entraining materials in several concrete-pavement projects. From 1941 to 1943 approximately 100 miles of air-entrained concrete pavements were constructed. In all of this work the air-entraining material was added at the mixer. The effectiveness of air entrainment in eliminating scale can be found in many cases where projects containing air-entrained concrete abut projects constructed with ordinary concrete.

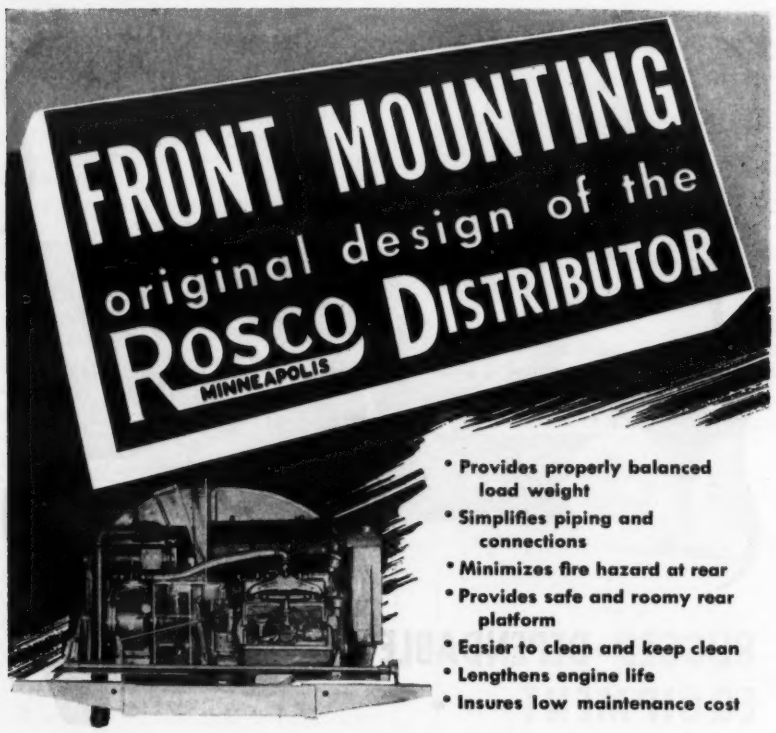
With the advent of air-entraining cement, the practice of adding air-entraining materials at the mixer practically ceased in Michigan. At the close of the construction season in 1945, Michigan had approximately 150 miles of two-lane pavement containing air-entrained concrete.

It is now generally acknowledged that the use of air-entraining materials in concrete pavements is a distinct step forward in the construction of better highways for the future, and indicates the successful solution of just one of the many problems confronting highway administration today. Michigan, recognizing the advantages to be gained by this new development, now requires that air-entraining materials be used on all concrete-pavement projects constructed under its jurisdiction.

From a paper presented at the 32nd Annual Road School, Purdue University, January 22, 1946.

Heads Telsmith Sales

Following his separation from duty as a Naval officer, Gerald L. Smith has returned to the Smith Engineering Works, Milwaukee, Wis., and has been named Vice President in charge of sales. He will be assisted in the marketing of Telsmith crushing-plant equipment by H. H. Schaper, present Assistant Sales Manager. Donald D. Barnes, who had been performing the duties taken over by Mr. Smith, will continue to serve as Executive Vice President.



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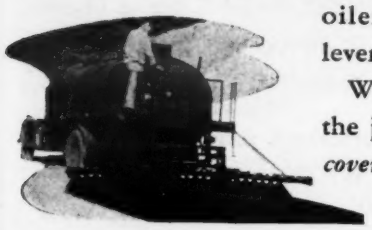

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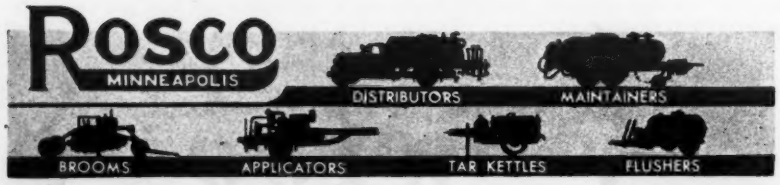

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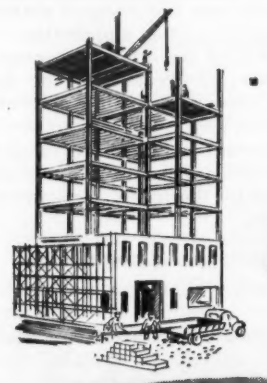

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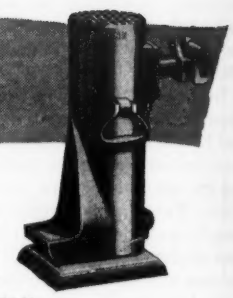

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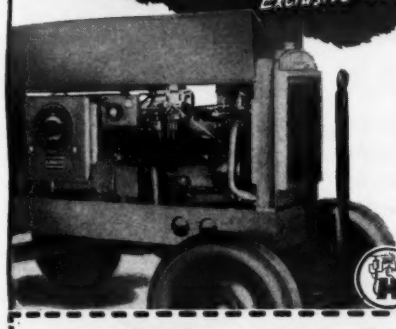

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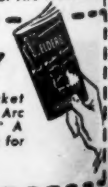

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Tar-Gravel Mix Laid As Surface Course

Old Road Covered With Layer of Gravel for New Foundation; Shovel Mixes Black-Top Materials

✦ A SPEEDY method was adopted by contractor C. C. Smith Co., Inc., of Cambridge, Mass., to mix gravel with tar for use as a surface course on a highway-improvement project in New Hampshire last autumn. A bituminous distributor sprayed tar from a long bar with four nozzles at one end onto a windrow of gravel which was being thrown up by a power shovel as it moved along on crawler treads, keeping pace with the slowly moving distributor truck. A bituminous spreader then laid this pre-mixed aggregate on top of a layer of bank-run gravel which had been used to cover and also widen a 20-year-old rough black-top pavement.

This 8.4-mile project was awarded to the contractor by the New Hampshire State Highway Department on a low bid of $102,896.64 to improve U. S. 4, the Fourth New Hampshire Turnpike, beginning 11 miles above Concord, the capital, and continuing beyond Salisbury. The original road was 18 to 20 feet wide, with a bituminous surface-treated pavement 1½ to 2 inches thick, and had an excessively high crown varying from 4 to 12 inches. After the severe cold and deep frosts of the winter of 1944-45, this pavement broke up badly, aided by the pounding from heavy milk trailers which use the road extensively. The improvement also included widening the pavement to 22 feet, with 1-foot shoulders.

Gravel Base Course

In a few locations light grading was done before work started on the gravel base course, entailing the excavation of some ledge rock from the ditch lines. Drill holes for the blasting were made by a Chicago Pneumatic wagon drill powered by a Gardner-Denver 315-cfm air compressor. With this grading completed, a course of bank-run gravel was spread over the surface of the old road, varying in thickness from 9 inches at the edge to 0 at the center line. This material came from three pits which the contractor secured, making payment to the owner for the number of yards of material removed.

The three pits were located within 1,500 feet of each other, from 500 to 1,000 feet off the road, and about 3 miles above the south end of the project. Excavation of the gravel was done by a Lorain 77 1½-yard shovel, which loaded the contractor's fleet of nine Sterling trucks holding about 6 yards each. The gravel was end-dumped on the road and spread by an Allis-Chalmers Model K tractor-dozer and two Caterpillar No. 112 power graders. Half the width of the road was done at a time for a distance of 300 to 400 feet, and then the other half of this section was finished, so that traffic could be maintained.

During the spreading, the gravel was wet down with water supplied from a 1,500-gallon tank mounted on an Autocar truck. This tank was formerly on an old gasoline supply-truck trailer, and had its bulkheads removed to make it more adaptable. The tank was filled from nearby creeks by a Marlow 4-inch pump driven by a Le Roi gas engine, and the water was applied to the gravel by gravity flow through a 7-foot spray bar at the rear of the truck. Compaction was secured mainly by the trucks and other traffic riding over the gravel, but it was also rolled by a 10-ton 3-wheel Buffalo-Springfield.

The gravel was put down in one course with the purpose constantly in mind to smooth out the profile of the road by filling in dips in the pavement, and also to increase the thickness of the gravel where the existing pavement was in particularly bad shape. A couple of laborers worked with the dumping and spreading, throwing out any stone that exceeded 6 inches in size. This maximum dimension of the pit-run gravel had to be modified, of course, when the base was laid to a shallow depth. An average of 1,000 cubic yards of base-course gravel was laid in a 10-hour day.

Shovel Does Mixing

Gravel for the surface course came from a pit selected by highway engineers because of the general excellent quality of the material found there and its uniform gradation. Originally the job was set up as a mixed-in-place type of surface-course construction, that is the top gravel would be laid, then given a tar application from a bituminous distributor, after which the ingredients would be mixed together by power graders. Highway officials agreed, however, to the method of mixing tar and gravel at the pit with a shovel, since the top quality of the material at hand insured all the particles being coated with bitumen after a thorough manipulation by the shovel.

(*Continued on next page*)

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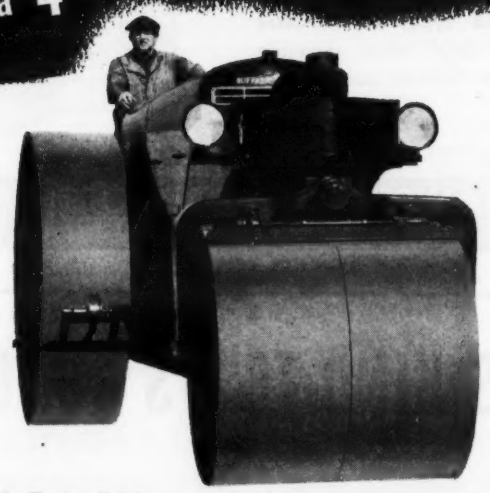

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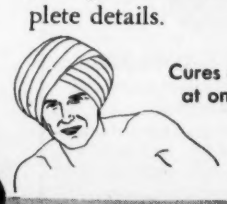

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Tar-Gravel Mix

(*Continued from preceding page*)

The pit, measuring 500 x 300 feet, was located 4½ miles above the north end of the job on State Route 11. A Gar Wood 12-yard scraper pulled by an Allis-Chalmers HD-14 tractor excavated and moved the gravel to one side of the pit, forming a long flat windrow with a trapezoidal cross section. An 11-foot crown width permitted the scraper to move along safely without slipping off the windrow that it was making. The volume of gravel was controlled by scraper-load measure. The usual procedure was to place 112 to 120 cubic yards in the pile and then apply 1,500 gallons of tar. At these proportions the tar was approximately 4½ per cent by weight of the total mixed aggregate.

T-5, the grade of tar used, came in tank cars from Worcester, Mass., via the Boston & Maine railroad to a siding at Andover, N. H., 2 miles from the pit. Here the tar was heated to a temperature of 125 degrees F and transferred to a Kinney 1,500-gallon distributor mounted on a Mack truck. The tar was purchased from and applied by the Trimount Bituminous Products Co. of Everett, Mass. To the top of the distributor tank was lashed a 20-foot bar at the end of which were grouped four nozzles, 8 inches apart. The bar was connected to an outlet on the tank and projected from it at right angles.

A Northwest 1¼-yard shovel had a system of chains welded to its bucket to aid in breaking up the slightly cemented gravel, thereby assisting the mixing process with the tar. From a point where each of the four teeth are joined to the bucket proper, two sets of chains were electric-welded and then stretched across the top of the bucket and welded to the other side. The chains, made up of ⅜-inch links, were of different lengths so that the gravel would come in contact with each separately as it ran through the bucket. All eight chains were connected to those suspended at the same level by cross links so as to present more metal for the gravel to hit during the mixing process.

Windrow to Windrow

Mixing operations were started with the shovel working from one end of the windrow, and casting the gravel to one side so as to form another windrow with a triangular cross section. As the shovel moved down the center line of the original windrow in its transferring operation, the bituminous distributor backed along the other side of the new windrow being formed, spraying the gravel with tar as it was being heaped up. Wooden stakes were put in the top of the first windrow at 35-foot intervals as a guide to the distributor operator so that 500 gallons of tar would be applied for that particular length. By watching the flow meter carefully, the operator usually managed to have the tar and gravel come out even at these markers. If there was an excess of tar, the distributor ran back over the 35-foot section to unload the specified amount of bitumen, while if the shovel had a little gravel left over it was spread along the top of the windrow section just formed.

The smoothness of this operation depended to a great extent on the precise positioning of the spray-bar nozzles, so that the apex of the triangular-shaped windrow received the application from above without interfering with the bucket movements of the shovel. With this method, every inch of gravel going to make up the new windrow, which was about 7 feet high and 18 feet wide at the base, was coated with tar. Then the shovel worked back along the center line of the original windrow, moving the newly formed pile of mixed aggregate a full swing away, making a new windrow of the same triangular cross section. After that it was shifted once again by the shovel to the position it had when the tar was being applied. From there the Allis-Chalmers HD-14 tractor bulldozed the gravel-tar mix into a stockpile.

In this thorough mixing process approximately 13½ gallons of tar was added to every cubic yard of loose gravel. When the materials were all ready, that is the windrow shaped by the scraper and the distributor loaded with tar, the usual average for a 10-hour day was around 3,000 to 6,000 gallons of tar applied. The best day was six distributor loads, or 9,000 gallons of tar used in pre-mixing the gravel.

In order to have the original windrow contain the exact number of cubic yards required for the proper mixing proportions, the Gar Wood scraper was loaded each time with only 8 yards of gravel. This amount in the bowl of the scraper was determined by loading a truck of known capacity, dumping it into the scraper until 8 cubic yards of gravel had been placed, and putting a chalk mark around the top of the material. In this way the operator knew just how much gravel he should pick up at each load. By the time the chalk mark wore off he knew to just what level he had to load the scraper. The operator was assisted by a helper who watched every load as it was picked up.

Laying the Mixed Gravel

The tar and gravel were mixed further when the shovel loaded the material from the stockpile into a fleet of ten Mack Model FN 5-yard trucks, rented from C. E. Hall & Sons of Somerville, Mass., on an hourly basis. They hauled an average of 450 yards of material in a 10-hour day to an Adnun Black Top Paver which spread the cold-mix in 11-foot lanes, or half the width of the road. The mix was laid in a single

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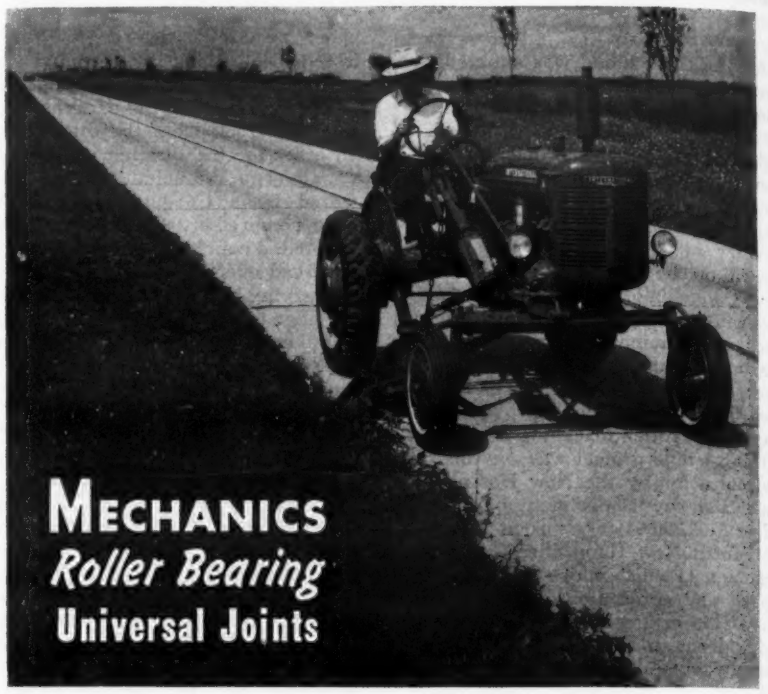

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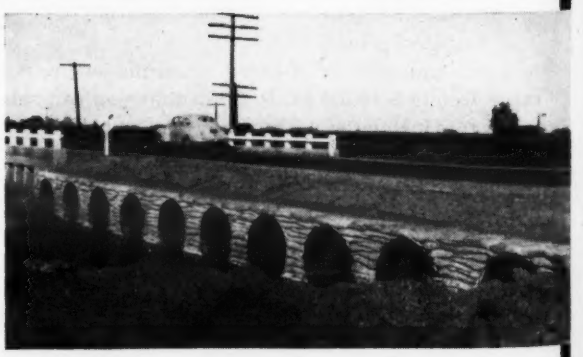

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Tar-Gravel Mix

(Continued from preceding page)

3-inch loose layer which compacted under rolling to 2¼ to 2½ inches. A Buffalo-Springfield 10-ton tandem roller which was loaded with diesel oil for an additional 3 tons did the rolling. The new surface has a crown of 2¾ inches.

As much as 4,000 feet of single-lane paving was laid in the regular 10-hour day. At this pavement thickness, a little over one gallon of tar was used for every square yard of surface. The gradation of this material was roughly about as follows:

Sieve Size	Per Cent Passing
2-inch	100
1-inch	60-85
¼-inch	25-70

Seal Coat

Traffic was permitted over the road immediately after the black-top was laid, and then the road was given a surface seal treatment over half the width at a time so as not to interfere with traffic. The seal consisted of 0.2 to 0.25 gallon of T-5 tar which was covered with a light coating of sand applied by a Burch spreader at the rate of 60 yards to the mile. The sand was taken from a gravel pit in a section where fines predominated, but in order to remove any pebbles or large stones a ¾-inch square-mesh screen was used. A drag broom, 8 feet wide x 12 feet long, with 6-inch flat steel brushes along the front, back, and two diagonal members, was then pulled by a truck over the surface so that, as far as possible, all particles received a coating of tar.

Items and Personnel

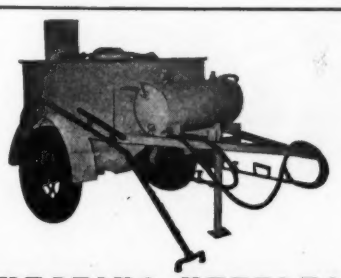
A force of between 50 and 60 men was employed for all operations on this project, which started on August 27. Due to the labor situation and cold weather, the job was not entirely completed, and a small amount of fine grading remains to be done this spring. C. E. Hall & Sons which supplied the rented trucks also furnished the drivers but they were put on the contractor's payroll. Two mechanics accompanied the fleet of trucks to service them. With them went a double greasing unit, mounted on a Ford truck, consisting of a Wayne air compressor with one air hose on a reel, and two hose and reels each for motor oil, gear lubricant, and chassis lubricant.

In order to get the work under contract as speedily as possible after the road was selected as a project to be improved, the Highway Department rushed plans through with a minimum of detail. A profile was run but no cross sections were taken, and the gravel that was used was paid for on the basis of pit measurements. In this way, even with reduced engineering personnel, the contract was made ready, the work commenced, and the surface completed and accepted before winter closed in.

The major items were:

Excavation	6,765 cu. yds.
Gravel borrow	32,000 cu. yds.
Gravel for bituminous stabilized surface	12,600 cu. yds.
T-5 tar	146,200 gals.

For the New Hampshire State Highway Department, Charles J. Downing was Resident Engineer, assisted by James Travis. Frederic E. Everett is Commissioner, D. H. Dickinson is Chief Engineer, L. F. Johnson is Maintenance Engineer, and J. O. Morton is Construction Engineer. Herbert Callahan was Superintendent for C. C. Smith Co., Inc., the contractor.



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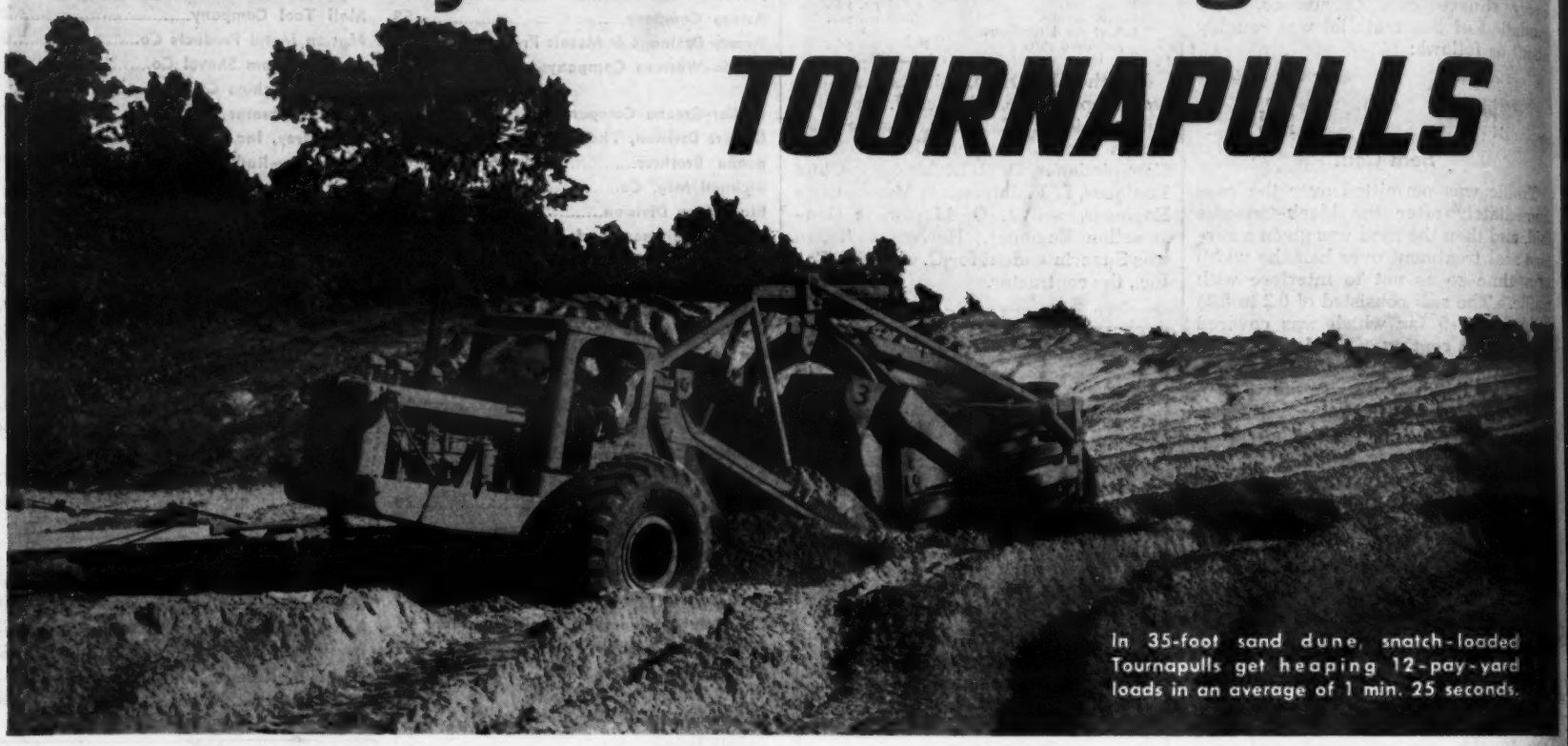
100,000 cu. yd. SAND DUNE licked by Paul Miller's big-tired TOURNAPULLS



In 35-foot sand dune, snatch-loaded Tournapulls get heaping 12-pay-yard loads in an average of 1 min. 25 seconds.

Actual load count over 3-day period shows EACH TOURNAPULL DELIVERS 480 PAY YDS. EVERY 9 HRS. ON 4200' ONE-WAY HAUL

PROJECT — To move 225,000 cu. yds. for General Motors Diesel Division plant site, near Grand Rapids. Almost half the yardage — 100,000 cu. yds. — is abrasive, fine white sand, which had to be loaded out of a 35-foot-high sand dune . . . hauled 4200' through a thickly-wooded park area, where tree-cutting restrictions necessitated narrow, winding haul roads . . . and spread in 6-inch layers over soft, spongy muck on the fill.

METHOD — Paul Miller Construction Company put four Tournapulls to work on the dune loading out sand. Here's how: Working down a 15% grade, using a snatch tractor and pump-loading method, each rig obtained 12 pay yard loads in an average 1 min. 25 sec. Tournapull 2-wheel design, plus big rubber tires, provided ample power to pull through the soft, loose material in the cut, on the fill and return up a 10% grade to the top of the dune.

PRODUCTION — A 3-day time study showed that each Tournapull made an 8400-foot round trip every 13.5 minutes . . . averaged 480 pay yards per 9-hour day . . . thus, proving Tournapull's ability to handle tough materials, despite adverse job conditions.

EXTRA USES — In addition to the above production, the Tournapulls picked up an occasional load of clay and gravel at the fill and spread it on the haul road on return trips, to help keep roads in fast-travel condition. After completing the fill, Paul Miller plans to use his Tournapulls to replace top soil, level and spread gravel and surfacing material on parking lot areas, etc.

IT WILL PAY YOU to check Tournapulls' lowest-net-cost-per-yard performance on your dirtmoving jobs. For job-proved facts and figures, see your LeTourneau distributor TODAY.

C43X

Same production is maintained through winter with temperatures near zero, 6" of snow, and sand freezing to depth of 4"!
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PEORIA, ILLINOIS • STOCKTON, CALIFORNIA
JOB-PROVED
Over 4250 Built and Shipped
TOURNAPULLS
* Trade Mark Reg. U. S. Pat. Off.